NCI CANCER RESEARCH: TODAY'S PROGRESS; TOMORROW'S CHALLENGES

HEARING

BEFORE THE

SUBCOMMITTEE ON HEALTH

OF THE

COMMITTEE ON ENERGY AND COMMERCE

HOUSE OF REPRESENTATIVES

ONE HUNDRED ELEVENTH CONGRESS

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NCI CANCER RESEARCH: TODAY'S PROGRESS; TOMORROW'S CHALLENGES

TUESDAY, MARCH 23, 2010

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON HEALTH,
COMMITTEE ON ENERGY AND COMMERCE,
Washington, DC.

The Subcommittee met, pursuant to call, at 2:05 p.m., in Room 2322 of the Rayburn House Office Building, Hon. Frank Pallone, Jr. [Chairman of the Subcommittee] presiding.

Members present: Representatives Pallone, Eshoo, Green, Capps, Schakowsky, Baldwin, Christensen, Castor, Space, Waxman (ex officio), Shimkus, Buyer, Burgess, Gingrey and Barton (ex officio).

Also present: Representative Biggert.

Staff present: Sarah Despres, Public Health Counsel; Anne Morris, Professional Staff; Stephen Cha, Professional Staff; Alvin Banks, Special Assistant; Aarti Shah, Minority Professional Staff; Clay Alspach, Minority Counsel; and Ryan Long, Minority Professional Staff.

OPENING STATEMENT OF HON. FRANK PALLONE, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Mr. PALLONE. I call the hearing to order.

Let me mention that votes were just called, so we will try to do—maybe we will see if we can get in the three people that are here, or at least myself and Mr. Shimkus, and then we will have to take a break and come back.

But let me say today, as you know, we are having a hearing on NCI Research: Today's Progress; Tomorrow's Challenge, and basically examining the cancer research efforts at the National Cancer Institute. It is a very important topic that is of great interest to many of my colleagues. Many of my colleagues have been asking us to have this hearing for some time.

Cancer is an ugly word. It is an even uglier disease. Unfortunately, cancer touches us all and everyone in this room has had either direct or indirect contact with cancer. Either a mother, a father, a brother, a sister, in almost all cases a friend has been diagnosed with some form of cancer. And some have fought the odds and survived. Others tragically have lost the battle. The bottom line is, far too many of us have lost people we care deeply about to this horrible illness. Cancer is the second leading cause of death in the United States. In fact, it accounts for almost every one in four deaths. Half of all men and one-third of all women will de-

velop cancer during their lifetimes, and today, millions of people are living with cancer or have had cancer.

The issue is a very emotional and personal one for me. In the spring of 2008, my mother was diagnosed with pancreatic cancer, and she passed away late that same year. Pancreatic cancer is obviously one of the diseases that we are looking at today in particular.

Fortunately, we have made great progress in cancer research over the last decades. Just 40 years ago, there were only 3 million cancer survivors. Today, 3 percent of the U.S. population has survived cancer. We have new therapies that specifically target the malignant tumors in an attempt to lessen the impact of the therapy on the patients. We have better screening and early detection methods which help identify cancer in the stages when it is more successfully treatable.

With the support of Congressional efforts over the next 2 years, NCI will grant $1.3 billion to cancer researchers across the country, and this money will go to fund additional grants for first-time investigators, thereby providing additional opportunities for the next generation of investigators and ensuring that the pipeline for new researchers remains stable. This additional funding will also go to initiatives that are expected to propel us forward in our understanding of cancer in the near future including efforts on the cancer genome atlas. I want to find out more about that today obviously. Also, research on personalized cancer care and new therapy development, collaborative cancer care work, just to name a few.

Nevertheless, we face serious challenges regarding rare and deadly cancers. Cancers that have been termed the deadliest cancers have a 5-year survival rate of less than 50 percent. These cancers include ovary, brain, myeloma, stomach, esophagus, lung, liver and, of course, pancreas. Pancreatic cancer is the deadliest cancer with a 5-year survival rate of only 5 percent. Combined, the deadly cancers make up half of all cancer deaths yet they receive a fraction of the research funding as compared to other cancers. It is clear that we still know far too little about these cancers. We have no or limited early detection and screening. By the time one of these cancers is diagnosed, it has often progressed too far for treatment to be successful. And I know some of our witnesses here today will speak to these issues and we look forward to their comments and recommendations.

As I think you know, we are a legislative subcommittee and so when we have oversight hearings like this, they are designed to try to see whether we should be legislating, so I want everyone to keep that in mind in terms of their recommendations as we move forward today.

Mr. PALLONE. And now I would like to recognize our ranking member, Mr. Shimkus.

Mr. SHIMKUS. Thank you, Chairman Pallone, for holding this important hearing about the progress and the challenges we face in tracking rare forms of cancer.

I want to thank all the witnesses for being here today to help educate members on this issue.

I have long been a supporter of cancer research but my former legislative director, Ray Fitzgerald's, battle with gastric cancer

brought this issue much closer to my heart. As Chairman Pallone said, everybody has personal stories and experiences.

I want to thank Ray's wife, Kristin, and their three young girls, Nora, Maggie and Lucy, who I think are hiding somewhere not disrupting—oh, they are back there—for testifying before the committee today. They were an inspiration to me and many others as they publicly shared the highs and lows of Ray's cancer. Kristin has continued to work tirelessly to expand efforts in the field of gastric cancer. I know her knowledge on the subject here today will help the committee advance efforts in that area. Also just for the record, she is a former congressional staffer, having worked for Harris Faywall, who is well known in the health legislative area, Judy Biggert and now our Republican leader, John Boehner. I also would like to thank Dr. Barker for being here today from the National Cancer Institute. I commend you and the NCI on the many things you do to make cancer curable, and I look forward to your institutional knowledge on what we can do from the federal side to progress our efforts in research on rare forms of cancer.

With that, Mr. Chairman, I yield back my time.

Mr. PALLONE. Thank you, Mr. Shimkus.

I think we have time for Mr. Gingrey, the gentleman from Georgia.

Mr. GINGREY. Mr. Chairman, I will waive my opening.

Mr. PALLONE. You want to waive? OK.

Ms. Capps, our vice chair.

Mrs. CAPPS. Thank you, Mr. Chairman. Before I make a brief statement, I wish to insert for the record written testimony of the International Myeloma Foundation regarding NCI Cancer Research: Today's Progress, Tomorrow's Challenges.

[The information follows:]

IMF

Written Testimony of the
INTERNATIONAL MYELOMA FOUNDATION
regarding
NCI CANCER RESEARCH: TODAY'S PROGRESS; TOMORROW'S CHALLENGES

Subcommittee on Health
Energy and Commerce Committee
US House of Representatives
March 23, 2010

The International Myeloma Foundation (IMF) appreciates this opportunity to submit testimony related to research on the most deadly forms of cancer at the National Cancer Institute (NCI). IMF is the oldest and largest myeloma foundation dedicated to improving the quality of life of myeloma patients while working toward prevention and a cure.

Background on Myeloma
Myeloma is a cancer of plasma cells that develops in the bone marrow and affects the production of red cells, white cells, and stem cells. It is also called "multiple myeloma" because multiple areas of bone marrow and bone may be involved. Myeloma is the second most common blood cancer after lymphomas, but it is also a relatively rare or "orphan" disease as defined by the Orphan Drug Act.

Myeloma is an incurable form of cancer. In 2009, 20,580 Americans were diagnosed with myeloma and 10,580 lost their battle with this disease. At any one time there are over 100,000 myeloma patients undergoing treatment for their disease in the U.S. The 5-year survival for multiple myeloma patients diagnosed in 2009 was estimated at only about 35% by the American Cancer Society.

Over the past 40 years the incidence of many cancers has decreased, but myeloma cases are increasing in incidence. Once a disease of the elderly, it is now found in increasing numbers in people under 65 and patients in their 30s are not uncommon. IMF-funded research suggests that this increase is associated with environmental toxins; as just one example, a disproportionate number of myeloma cases have been diagnosed in clean-up and rescue workers at the 9/11 World Trade Center site.

Although important advances have been and continue to be made in the treatment of myeloma since the IMF was founded in 1990, these treatments all come with significant and problematic side effects that significantly impact quality of life. Even while they live with the disease, myeloma patients can suffer debilitating fractures and other bone

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disorders, severe side effects of their treatment, and other problems that profoundly affect their quality of life, and have major impact on the cost of their health care.

Deadly Cancer Research at the National Cancer Institute

The IMF joins with its partner members of the Deadly Cancers Group in bringing to the attention of this Committee that, while a number of cancers have achieved 5-year survival rates of over 80% since passage of the National Cancer Act of 1971, significant challenges still remain for other types of cancers, particularly the most deadly forms of cancer. **More than half of the 562,340 cancer deaths in 2009 were caused by eight forms of cancer with 5-year survival rates of 45% or less: pancreatic, liver, lung, esophageal, stomach, brain, multiple myeloma, and ovarian.** Yet, these eight cancers have historically also received the least amount of federal funding. As indicated earlier, the 5-year mortality rate for myeloma is still only about 35%.

The IMF is highly supportive of long-term initiatives of the NCI such as the Cancer Genome Atlas and associated projects; however, these initiatives are highly unlikely to have any impact whatsoever on the care or survival of people already diagnosed with myeloma, or even those diagnosed with myeloma in the next 5 years, many of whom will die long before such projects bear fruit. In addition to such long-term initiatives that will benefit all those at risk for cancer in the long term, the NCI needs to emphasize the critical importance of focused research monies that support "out-of-the-box" innovative research into the causes and progression of myeloma and the other deadly cancers. It is widely understood that research on one form of cancer may yield basic or applied knowledge related to other cancers, and this has been particularly true for the application of blood cancer research to other cancers. Treatments that were initially developed for blood cancers are now used in treatment of solid tumors, and the basic research on blood cancers fuels basic research advances in other cancers, as well.

The IMF is fully supportive of the proposals laid out by the Deadly Cancers Group for the establishment of a "Targeted Cancers" program within NCI for cancers with 5-year survival rates of less 50%. This initiative would require a comprehensive plan of the research activities necessary to increase survival well above the 50% survival threshold; be authorized at a level commensurate to these cancers' mortality and public health impact; conduct research activities through its own grant making authority and through leveraging the grant making authority of other NCI divisions and programs.

Environmental Risks Associated with Myeloma

Once considered a "rare disease of the elderly," myeloma is increasingly being diagnosed in patients under 45 years old. Data from the IMF's Bank On A Cure® initiative has already identified several changes in DNA sequences called SNPs (single

IMF

nucleotide polymorphisms) that are associated with the risk of bone disease in myeloma. Further analysis has shown that many of these DNA changes may be involved with the way the human body responds to certain environmental toxins, providing a possible link between myeloma and the environment.

The findings may help explain a widely reported study published last year in the *Journal of Occupational and Environmental Medicine*, that found more cases of myeloma among younger responders to the 9/11 World Trade Center site than would normally be expected. The findings are also supportive of a study published in 2009 that suggests a link between exposure to certain pesticides among agricultural workers and a precursor to multiple myeloma. Previous studies have also shown an increased risk for myeloma among firefighters.

The federal government has already recognized its responsibility to military personnel whose health may be endangered simply through their service to the country: the Institute of Medicine conducts periodic evaluations of the health consequences of environmental exposures and the Department of Veterans Affairs provides benefits to those diagnosed with blood cancers caused by or associated with environmental toxins. These toxins include Agent Orange for Vietnam veterans, ionizing radiation for atomic veterans, and benzene for Gulf War veterans.

Grant Funding for Young Investigators

For the past 15 years, the IMF's research initiatives have been highly focused on funding promising young researchers and clinical investigators from around the world in an effort to improve outcomes for myeloma patients. Giving young researchers the belief that there will be long-term opportunities for them to conduct scientific and clinical research into myeloma is fundamental to the improvement of opportunities for myeloma prevention, better treatments, and longer survival. But more needs to be done to provide grant funding for young investigators and to stimulate careers in research into myeloma and other forms of deadly cancer.

The IMF supports the development by the NCI of specialized training programs and education programs for early career PhD and clinician scientists that protects their time for research, to attract and retain a broader pool of investigators for myeloma and the other deadly cancers.

Conclusion

The IMF stands ready to work with policymakers to advance policies and support programs that work toward prevention and a cure for myeloma. Thank you for this opportunity to discuss research needs at the NCI to ensure that our nation continues to

IMF

make gains in the fight against myeloma and other deadly cancers. Please do not hesitate to contact us should you have any questions or need more information.

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Mr. PALLONE. Without objection, so ordered.

Let me—it has been very busy and crazy around here the last few days so I overlooked, and I do want to mention that not only is Lois Capps our vice chair and one of the hardest working members of this subcommittee but also she has taken a particular interest in this subject, asked that we have this hearing today, and I think is also developing legislation——

Mrs. CAPPS. Yes.

Mr. PALLONE [continuing]. On some of this, so thank you.

Mrs. CAPPS. Thank you, Mr. Chairman, and thank you to our witnesses and to all of you for being here.

It is so appropriate in my opinion that we are holding this particular hearing just 2 days after our historic passage of comprehensive health reform legislation. After all, while our witnesses today will be able to highlight just how advanced and cutting-edge cancer research is in the United States, now passage of legislation will finally mean that more American patients can take advantage of the treatment and the therapies that you all have developed.

I am eager to learn from our witnesses today about the direction of cancer research and how we can develop better policies in Congress that mesh with the work that you are doing. I think we know now that collaboration is key and it is important that legislation and funding are geared toward facilitating collaboration.

We also know that research is incomplete unless we also include research on best practices for providing cancer care in the clinical setting. I am particularly interested in that phase of it, but I see it as a collaboration with what you are doing. While it isn't the focus of today's hearing, I urge the chairman to consider holding a hearing in the near future to discuss this issue of cancer care as well.

With the passage of health reform, a lot of us are getting back to our other health care priorities that we have held long, and this is one of mine. I am proud to be working with Chairman Pallone and several members of this committee to prepare a House companion to one of Senator Ted Kennedy's priorities, the 21st Century Cancer ALERT Act. This bill will put emphasis on enabling federal research dollars to model the trends of modern cancer research. Additionally, it will focus on patients as survivors and the concept of living with cancer. With the right types of investment, we can truly put an end to the days of cancer as a death sentence as it has been for so many of our loved ones.

I look forward to continuing to work with the committee to advance this legislation, and I hope we can use what we learn today to perfect the language that we are developing, and with that, I yield back, Mr. Chairman.

Mr. PALLONE. I think, Mr. Buyer, there is maybe 3 or 4 minutes left. Do you want to go now or would you rather——

Mr. BUYER. I will reserve.

Mr. PALLONE. OK. Then we will go in recess until we have—oh, Donna, did you want to do your statement? The gentlewoman from the Virgin Islands, Mrs. Christensen.

OPENING STATEMENT OF HON. DONNA M. CHRISTENSEN, A REPRESENTATIVE IN CONGRESS FROM THE VIRGIN ISLANDS

Mrs. CHRISTENSEN. Thank you, Chairman Pallone and Ranking Member Shimkus. Thank you for holding this hearing.

You know, there is not one of us here whose life has not been touched by cancer, and in my 21 years of practice, my patients with cancer have given me some of the highest highs, like an elderly lady with early-found colon cancer who is still surviving many years later, and some of the lowest lows such as women with breast cancer who came so very late that nothing could be done, and African Americans, while we may not have the highest incidence of many cancers, have the shortest survival rates and the highest deaths of any other population group in this country and so this hearing is very important to me personally and as chair of the Congressional Black Caucus's Health Brain Trust. If we look at some other population groups, cancer has already surpassed heart disease as a leading cause of death for Asian Americans and Pacific Islanders.

There has been a lot of progress that we are very proud of in cancer research at the National Cancer Institute, and all of NIH is to be commended for the transdisciplinary programs, the linking of genomics and cancer and advances in molecular biology and technologies. I don't know where the balance should be but I do hope that the role of environmental and behaviors is given adequate attention as well.

Of great concern given the disparities that exist in African American and the projections for even greater incidence of cancer in the future is how are we going to be able to ensure that the new diagnostic and treatment modalities reach everyone and reduce rather than exacerbate the disparities that now exist. So I would like to know what progress is being made and including racial ethnic minorities and women adequately in clinical trials, and just as important, how many principal investigators are at minority-serving institutions, which is what would really help to increase our participation, which is very critical to reducing the longstanding disparities.

I would like to welcome you, Dr. Barker, and the other panelists on the second panel. We look forward to your testimonies. Thank you.

Mr. PALLONE. Thank you, Dr. Christensen.

So we will now recess, and I think there are three votes so I guess maybe 45 minutes, maybe less. The subcommittee hearing is in recess.

[Recess.]

Mr. PALLONE. The subcommittee will reconvene. Now, I know that there were some that did not have a chance to do openings so we will have that now for those of you who didn't. I think next was the gentlewoman from Florida, Ms. Castor.

Ms. CASTOR. In the interest of time, I would really like to hear the witnesses so I will submit my opening statement for the record. Thank you, Mr. Chairman.

[The information was unavailable at the time of printing.]

Mr. PALLONE. Thank you.

The gentleman from Texas, our ranking member.

Mr. BARTON. Mr. Chairman, I will put my statement in the record. I agree, we need to get to the witness, but thank you for giving me the opportunity.

[The prepared statement of Mr. Barton follows:]

March 23, 2010

STATEMENT OF THE HONORABLE JOE BARTON

RANKING MEMBER COMMITTEE ON ENERGY AND COMMERCE

SUB-COMMITTEE HEARING:
"NCI-CANCER RESEARCH"

Thank you, Mr. Chairman, for having this hearing.

Cancer has impacted most of the 100 million households in America, and my family has been typical. I imagine that every one of us in this room today can tell about a loved one lost to cancer. That's because cancer is an equal-opportunity destroyer of lives. It does not discriminate according to ethnicity; it afflicts men, women and children, and it lays low the rich, the middle class, and the poor with great vigor. Cancer is the second leading cause of death in our country. 1.48 million Americans are diagnosed with cancer each year, and last year, 560,000 died of it.

The disease even extracts a toll from the U.S. economy. The National Institutes of Health (NIH) estimates that, quote, "the economic cost of cancer in 2005 was estimated at over $200 billion." That includes $74

billion in direct health care costs and another $135 billion in indirect costs caused by lost productivity.

I am pleased to have Kristen Fitzgerald, the wife of a longtime staffer for Congressman Shimkus, Ray Fitzgerald. Ray passed away from gastro-intestinal cancer. GI cancer is rare and like other rare cancers, the mortality rate is high. It is important that we are having this hearing to spotlight those types of cancers that often are overlooked. Rarer forms of cancer are often diagnosed after the tumors have grown, and because the patient population is smaller, research dollars are scarcer and progress on treatments, slower.

The NIH's National Cancer Institute (NCI) is the federal agency that we have charged with researching cancer. The NCI's work has produced many significant advances in our knowledge and treatment of cancer. I'm a strong supporter of NIH because I know that good science saves lives, and today I hope to hear from the Cancer Institute how they are approaching rarer forms of cancer.

We're here today to learn about the research efforts and progress made towards curing cancer. I want to thank our witnesses today for their

commitment to finding a cure and to educating the public. I look forward to hearing their testimony.

I yield back the balance of my time.

Mr. PALLONE. Thank you.

Ms. Eshoo.

Ms. ESHOO. Thank you, Mr. Chairman. I will put my full statement in the record, but let me thank you for having this hearing today.

I am pleased that our subcommittee has the stamina to push forward, especially on this important hearing because cancer is the second leading cause of death in our country, and it is really amongst the most dreaded words that anyone can ever hear. Everyone in this room and beyond this room has been affected by this disease in some way, shape or form, either themselves, someone in their family, a colleague, a child, a grandparent, an aunt, an uncle, a neighbor. So really, so many of us, I believe, we are all like one diagnosis away from something.

There are several bills, Mr. Chairman, that members have authored in the committee, and what I would urge you to do is to put together a compendium of these bills from both sides of the aisle and really see what we can move in this Congress. Sometimes bills don't have to be gigantic to really have an impact, especially in a specific area. So——

Mr. PALLONE. Would the gentlewoman yield?

Ms. ESHOO. Certainly.

Mr. PALLONE. Let me just mention that—I mean, not that we are making excuses but as you know, there was so much of the legislation that many of you have introduced on both sides of the aisle was either in the health care reform or impacted by the health care reform, and I think what we are going to do during the break, you know, the 2 weeks, is to try to sift through all that and see what is still relevant and not included in the bill, you know, once we go through reconciliation and then get back to all of you and say, OK, these are the things that we need to consider now between now and the end of the session.

Ms. ESHOO. That would really be wonderful, Mr. Chairman. Thank you.

And I just want to add how proud I am that in my Congressional district that we have a National Cancer Institute-designated cancer center at Stanford University and the work is really extraordinary, so the investments in this are amongst the best we can make as a society.

I look forward to hearing from the witnesses and thank all the people that have been advocates for years and years and years. Hang in there. We all need each other and we have got to get more done on this. Thank you.

[The information was unavailable at the time of printing]

Mr. PALLONE. I thank the gentlewoman.

The gentleman from Ohio, Mr. Space.

Mr. SPACE. Thank you, Mr. Chairman. I too waive my oral statement orally and submit it for the record.

[The prepared statement of Mr. Space follows:]

ZACK SPACE

OPENING STATEMENT – CANCER RESEARCH

March 23, 2010

Thank you, Mr. Chairman, and thank you for holding a hearing on an issue that affects all of us so much.

In fact – that's the first point I'd like to bring up. What disease other than cancer has had such an impact on the lives of American people?

Who hasn't lost a loved one to the disease?

Who hasn't felt the pain and the agony of watching someone they know suffer as their body rebels against them?

Simply put, we all have stories relating to cancer, and we all know the critical importance of addressing the disease.

We all have also, at some point, wished that we could cure this disease, and do away with it altogether.

Fortunately, while too many stories about people with cancer end in tragedy, there are many good stories to tell from those who have bested the disease and gone on to live long and fruitful lives.

These stories are in thanks to the researchers around the country who are blazing a trail toward improving our understanding of cancer, and well as finding new and exciting ways to treat it. As we will hear from our witnesses today, there is groundbreaking research going on all over the country that provides much reason for optimism.

My home state of Ohio is home to two of the NCI's designated cancer centers – Case Western University and The Ohio State University. Ohio State is in the midst of exciting work to expand its hospital facilities, which will allow for critical care to cancer patients all over the state and in my home state of Ohio.

Even with all of this important work, I think that we as a Congress have a challenge before us today. A challenge, but also an opportunity.

As the federal government of the most powerful country in the world, we have the resources and capability to sponsor research that will make new and definite strides toward ridding our society of this plague.

I support proposals to significantly increase the budget of the NCI this year. It is past time that we make these kinds of investments into cancer research – research that will directly improve the lives of all those suffering from cancer, as well as their friends and loved ones.

In closing, Mr. Chairman, I want to thank all the witnesses for appearing today. I am hopeful that we can use their testimony to develop positive, bipartisan ideas to what is a very real problem before us.

I thank you, and I yield back.

Mr. PALLONE. Thank you, and I think that concludes our opening statements. Did you want to say something?

Mr. SHIMKUS. Mr. Chairman, I ask unanimous consent that Congresswoman Judy Biggert be allowed to make an introduction of a former staffer on the second panel, and Judy.

Mr. PALLONE. Without objection, so ordered.

Ms. BIGGERT. Thank you, Chairman Pallone, and Ranking Member Shimkus for giving me this opportunity to address the subcommittee. I am honored to introduce to the subcommittee today Kristin Fitzgerald, who not only is a constituent of mine from Naperville, Illinois, but she is also a valued former member of my staff and the staff of the Education and Workforce, now the Labor Committee. But it is not Kristin's expertise as an outstanding Congressional staff member that brings her to this subcommittee today. Rather, it is her experience in seeking treatment and a cure for a rare cancer that afflicted her late husband and dear friend of mine and Ranking Member Shimkus, Ray Fitzgerald. Kristin kept me, Mr. Shimkus and the rest of us on Capitol Hill informed via daily e-mails as to what was happening with her husband's treatment, and we felt like we were able to be with her every day during that difficult time. Unfortunately, just over a year ago, Ray passed away from gastric cancer a mere six months after he was diagnosed.

After seeing firsthand the strengths and weaknesses of the cancer treatment system here in America, Kristin has used her knowledge of government to advocate for improvements in the dissemination of best practices at the NCI and other research facilities across the country. I believe that her ideas have the power to speed cancer research by better leveraging and coordinating our current efforts. Given the excellent work that she did in my staff, I have no doubt that she is up to the task. And with that, I would yield back.

Mr. PALLONE. Thank you. Kristin is actually going to be on our second panel.

Before we go to our witnesses, though, let me just mention that our chairman, Chairman Waxman here is here, and if he would like to give an opening statement, we haven't begun with the witnesses yet.

Mr. WAXMAN. Thank you very much, Mr. Chairman. I thank you for holding this hearing and giving us the opportunity to hear from the National Cancer Institute and other witnesses about the Institution's cancer research efforts.

Cancer is a complex disease. We know that genetic, environmental and other factors all contribute to an individual's risk for developing cancer, so discovering cures and developing effective treatments are complex, difficult and expensive endeavors as well. We have made tremendous progress in reducing cancer deaths and new cancer cases due in large part to scientific advances over the last decade. However, cancer remains the second leading cause of death in this country and may soon overtake heart disease as the Nation's number one killer. One and a half million people are diagnosed with cancer each year. Eleven million people are cancer survivors. Cancer is particularly devastating for members of certain communities. Racial and ethnic minorities experience disproportionately high rates of cancer cases and death. All these individ-

uals, their families and friends know all too well the tremendous physical, emotional and financial toll of this disease.

In the past 5 years, we have made strides in combating certain forms of cancer such as breast and cervical cancer. Other cancers pose new challenges. For example, while colorectal cancer rates have decreased overall, the number of people under 50 with this type of cancer is on the rise, and eight types of cancer, those that we often don't hear much about, account for half of all cancer deaths. I know these so-called deadly cancers are of particular interest to the chairman, Mr. Shimkus and other members of the subcommittee.

Today we have an opportunity to learn more about cancer research conducted and supported by the NCI to better understand where we are and where we hope to go in making advances to beat this terrible disease. This research spans the continuum of discoveries starting at the laboratory bench, then translating scientific breakthroughs into clinical application and finally testing for safety and efficacy to determine if new innovations really work at the patient's bedside.

In every regard and throughout the world, NCI is considered the preeminent institution for biomedical research on cancer. The research funded by NCI will enable us to discover and ultimately deliver the best possible prevention, detection, diagnosis and treatment tools to all Americans. As we will hear, there is much to be excited about and, of course, there remains much work to do. I want to thank Dr. Barker and all of our witnesses for being here today, and I look forward to their testimony. Thank you.

[The prepared statement of Mr. Waxman follows:]

Opening Statement of Rep. Henry A. Waxman
Chairman, Committee on Energy and Commerce
Hearing on "NCI Cancer Research:
Today's Progress; Tomorrow's Challenges"
March 23, 2010

Thank you, Chairman Pallone, for holding this hearing today and giving us the opportunity to hear from the National Cancer Institute and our other witnesses about the Institute's cancer research efforts.

Cancer is a complex disease. We know that genetic, environmental, and other factors all contribute to an individual's risk for developing cancer. So discovering cures and developing effective treatments are complex, difficult, and expensive endeavors as well.

We have made tremendous progress in reducing cancer deaths and new cancer cases, due in large part to scientific advances over the last decade. However, cancer remains the second leading cause of death in this country and may soon overtake heart disease as the nation's number one killer. One and a half million people are diagnosed with cancer each year. Eleven million people are cancer survivors.

Cancer is particularly devastating for members of certain communities. Racial and ethnic minorities experience disproportionately high rates of cancer cases and death.

All these individuals, their families, and friends know all too well the tremendous physical, emotional, and financial toll of this disease.

In the past five years, we've made great strides in combating certain forms of cancer, such as breast and cervical cancer. Other cancers pose new challenges. For example, while colorectal cancer rates have decreased overall, the number of people under 50 with this type of cancer is on the rise. And eight types of cancer -- those that we often don't hear much about -- account for half of all cancer deaths. I know these so-called deadly cancers are of particular interest to Chairman Pallone, Mr. Shimkus, and other Members of the Subcommittee.

Today, we have an opportunity to learn more about cancer research conducted and supported by NCI – to better understand where we are, and where we hope to go in making advances to beat this terrible disease. This research spans the continuum of discoveries -- starting at the laboratory bench, then translating scientific breakthroughs into clinical application, and finally testing for safety and efficacy to determine if new innovations really work at the patients' bedside. In every regard and throughout the world, NCI is considered the preeminent institution for biomedical research on cancer.

The research funded by NCI will enable us to discover and ultimately deliver the best possible prevention, detection, diagnosis, and treatment tools to all Americans. As we will hear, there is much to be excited about. And of course, there remains much work to do.

I want to thank Dr. Barker and all of our witnesses for being here today. I look forward to their testimony.

Mr. PALLONE. Thank you, Chairman Waxman.

Mr. Green, would you like to make an opening?

Mr. GREEN. Thank you, Mr. Chairman, and I would like to have my full statement in the record, but I can't get away without—I represent a district in Houston and we have there great NCI facilities at the University of Texas, Health Science Center, Baylor College of Medicine and of course the University of Texas M.D. Anderson Cancer Center. I thank NCI for what you are doing because I see it every day when I am home, so thank you.

I ask unanimous consent to place my full statement in the record.

[The prepared statement of Mr. Green follows:]

Statement of Congressman Gene Green
Committee on Energy and Commerce
Subcommittee on Health
National Cancer Institute Cancer Research: Today's Progress; Tomorrow's Challenges
March 23, 2010

Thank you for holding this hearing today on research at the National Cancer Institute and their designated research centers.

Today we will be talking about ongoing research at the NCI and its research centers. We will also be discussing rare cancers and the challenges associated with diagnosing and treating these deadly cancers.

Texas has three NCI designated cancer research centers- UT Health Science Center, Baylor College of Medicine, and the University of Texas' MD Anderson Cancer Center.

MD Anderson Cancer Center is frequently recognized as the top cancer center in the country. It is one of the original three Comprehensive Cancer Centers designated by the National Cancer Act of 1971, and it remains the only one in Texas.

Baylor College of Medicine in Houston coordinates more than $100 million in total cancer-related research support, including nearly $40 million from the National Cancer Institute.

UT Health Science Center in San Antonio is known for its Cancer Therapy & Research Center Institute for Drug Development as largest integrated drug development programs in the world. Patients from around the world participate in Phase I, II and III clinical studies.

Over the years our office has helped many individuals access cancer treatment at these wonderful institutions.

Most recently, one of our constituents was diagnosed with Stage 4 melanoma. Like many individuals who are diagnose with late stage cancer-- treatment is particularly difficult.

After a long battle with his insurance company, he was able to access an experimental treatment program at MD Anderson. After long months of difficult treatment, the therapy seemed to be successful.

Unfortunately, his condition worsened and our office worked with MD Anderson to get him into an additional clinical trial. I am sad to say that my constituent, who was a community figure with a wife and small children, passed away before we could get him into the new clinical trial.

When facing any type of cancer, especially the rare and potentially fatal type, knowing that you can access all types of treatment- even experimental is especially important. Patients want to explore every option available to them and that is why the research conducted at the NCI and its research centers is so important.

We continue to diagnose many individuals with deadly cancers like pancreatic, lung, brain, liver, and ovarian in the very late stages, which makes them even more difficult to treat. It is important we begin to explore how to make these diagnoses earlier so individuals have increased survival rates.

With continued funding and research the diagnostic tools and treatments we consider experimental could one day be routine.

NCI research performed in Texas – and other impressive research facilities across the nation – will yield continued contributions to our understanding of various forms of cancer and the development of effective treatments to improve the health and well-being of all Americans.

I want to thank out witnesses for appearing before the committee today and thank you Mr. Chairman for holding this hearing.

I yield back my time.

Mr. PALLONE. Without objection, so ordered. And all statements by members in full will be put in the record if they so desire.

Let me move to our first panel and only witness, who is Dr. Anna D. Barker, deputy director of the National Cancer Institute. Welcome, and thank you for being here today. I am not going to go through the drill. You know how we operate, so I recognize you for an opening statement.

STATEMENT OF ANNA D. BARKER, PH.D., DEPUTY DIRECTOR, NATIONAL CANCER INSTITUTE

Ms. BARKER. Thank you very much, Mr. Chairman and members of the subcommittee. It is my great pleasure to be here, and I want to thank you for the opportunity to testify today and for holding this hearing. The timing couldn't be more appropriate, I think.

I am the deputy director of the National Cancer Institute. I also have the singular pleasure actually of directing the strategic science initiatives for the Cancer Institute, and I will be talking about a couple of those today that I think you will find of some interest. It is really an exciting time in cancer research, as you heard earlier today. I would like to highlight a few of the advances in my testimony today and we can discuss them later, but I think we have unprecedented opportunities now to really increase progress against this disease that still tragically affects almost all of us in one way or another.

So an unprecedented convergence of advances in molecular biology and advanced technologies is beginning to transform our understanding of the mechanisms of cancer, and that is incredibly important. Cancer is a disease of changes in our genes, so if I don't deliver any other message today, maybe we can take that away. Some of these genes are inherited. You can't choose your parents. But some of them, actually most of them are actually acquired as a consequence of the way we lives our lives. As you will hear, we are systematically identifying these genomic changes in cancer, which is allowing us to finally identify the molecular basis of subclasses of cancer and develop targeted interventions. That is quite a step.

These discoveries really represent a paradigm shift. It will take time but knowing the molecular makeup of a cancer will allow a patient to be treated according to their tumor's signature. As the cost of sequencing the human genome continues to fall, and it is falling almost daily, and bioinformatics facilitates the availability of an electronic medical record that captures all of a patient's data in this next decade, and beyond, we are going to transform the way cancer is diagnosed, treated and prevented.

NCI is leading this revolution through programs that range from studies that define specific changes in the genomes of cancer patients to nanotechnology-based diagnostics that can detect miniscule amounts of cancer in a patient. I would like to tell you a little bit about a few of these programs in this limited time that I have, but I think the programs I am going to tell you about will change our definition of cancer, allow us to better understand why certain cancers have poor outcomes and provide new approaches to control all cancers.

Led by Dr. Francis Collins and myself in 2005, the NCI and the NHGRI, which is the National Human Genome Research Institute, launched a groundbreaking collaboration called The Cancer Genome Atlas—I will refer to it from now as TCGA, which you should remember—to ultimately identify and catalog all of the relevant genomic changes in most types of cancer. This is an enormous undertaking. The Cancer Genome Atlas is one of those paradigm-shifting programs that I mentioned earlier. It employs state-of-the-art genomic characterization and sequencing technologies, engages a network of multidisciplinary centers, which is actually composed of tens of institutions and hundreds of experts in genomics in cancer biology and deposits all of the data in a public database. TCGA is the largest and most comprehensive analysis of the molecular basis of cancer ever undertaken and the project has already faced and overcome a large number of technical and scientific challenges in the first three years.

We launched TCGA with a study of glioblastoma, which is the most prevalent human brain tumor in adults, and ovarian cancer and squamous cell cancer of the lung had followed soon thereafter. In 2008, the first major results of the TCGA pilot program produced a map of these three key pathways that are disrupted in GBM and defined the four specific molecular subtypes of this cancer, paving the way for identifying the right patient for the right drug. The availability of a highest-quality, multidimensional data set on a statistically valid set of high-quality samples is bringing new investigators and teams forward to study GBM in large numbers. This is one of the goals of TCGA, so we are bringing tons of people to the table to study this cancer.

We are about to do the same thing for high-grade serous ovarian cancer, which is responsible for most ovarian cancer and a major contributor to the overall 5-year survival rate of only 31 percent. These data are being finalized for publication. I haven't talked to anybody about the data but I am going to tell you a few things that no one else will know. First, at one level, ovarian cancer looks quite different from GBM at the genomic level but in another way it looks quite similar. Ovarian cancer is a study of genome instability with a highly disrupted genome. It is a disease of copy number change, which actually means a disrupted genome. This instability is likely driven by nearly wholesale changes in only three genes. There are three distinct molecular subtypes of ovarian cancer confirmed at multiple levels of the genome. The distinct pathways disrupted in ovarian cancer where there are signatures can predict survival duration. That is quite a finding. Overall, the tumor is driven by defects in genes that are responsible for repairing damaged DNA, and there are a number of other rare genes that may represent new targets for drug development. The data is going to open a whole range of new windows of exploration for diagnosis and treatment of ovarian cancer that I predict will change the future for ovarian cancer patients hopefully on an accelerated schedule.

The value of TCGA will ultimately be measured in many advances but perhaps one of the most striking is the value of the integration and analysis of multidimensional data about the many cancers it will study. Using ARRA funds, we are currently expanding

the scope of TCGA to explore 20 additional cancers over the next 5 years, 10 in the next 2 years. Many of these studies will include the rare and deadly cancers that you will all be asking me about later.

One additional comment I would like to make is that one of the rate-limiting steps in TCGA has been the availability of rare cancer samples and very high-quality cancer samples, and we are hoping to work with the advocacy community to fix that problem. Achieving high-quality biospecimens for the country is a major challenge. This is the foundation for personalized cancer medicine. It is also a problem in terms of the way standard of care is practiced in this country and it is also a problem with most of the tumor samples in the country where only about 30 percent of those samples are available and can be used in a high-quality study like TCGA. NCI has launched something called the cancer Human Biobank to deal with that issue, so we are going to have a national biobank.

The other program that I wanted to highlight just for the last minute is basically what we are doing in nanotechnology. Nanotechnology, as you know, is allowing us to measure things at levels we only dreamed about a few years at 1 to 100 nanometers, roughly the size of a water molecule to the size of a bacterium. Recently, we have been able to show with nanotechnology that you can measure in this particular case cancer changes roughly six times more sensitively than some of the diagnostic tests that we are using today. Northwestern University reported just 2 weeks ago using a barcode assay in DNA, they can actually detect prostate cancer at a level that is unheard of, and we believe going forward we will be able to use that kind of information to detect these cancers much, much earlier.

Another recent breakthrough that was only published yesterday from the Nanotechnology Alliance for Cancer, which was started by NCI 5 years ago, we are now able to know that there is a piece of the genome actually called RNAI that actually blocks the expression of certain genes. We haven't been able to deliver that. It gets actually degraded in the body. We had a nanotechnology investigator from California, actually from Cal Tech, report just yesterday that they have been able to deliver this to patients and it is going into phase II trials. Again, this is another breakthrough from the nanotechnology program that NCI started about 5 years ago.

At NCI, we are really proud of the progress we are making in these advanced technology programs. We are excited by the opportunities that lie ahead and challenged by the daunting amount of work that we have yet to do. We are dedicated to achieving a future where the shadow of cancer is removed from our lives and those of our children and our grandchildren. This increasingly seems to me like an achievable mission and a vision for every American that we can achieve hopefully in this next decade. NCI and NIH and are committed to moving us all forward toward this future, and I have never been more excited about believing that we will achieve this future for every patient, for every family and everyone touched by cancer, including my own. I have lost all of my family to cancer. I have been in this field for my entire career. I lost my grandmother to pancreatic cancer, two additional relatives

to pancreatic cancer, my mother to breast cancer, my sister to breast cancer and my father to lung cancer.

Thank you.

[The prepared statement of Dr. Barker follows:]

Testimony
Before the
Subcommittee on Health
Committee on Energy and Commerce
United States House of Representatives

National Cancer Institute Research: Today's Progress; Tomorrow's Challenges

Statement of
Anna D. Barker, Ph.D.
Deputy Director
National Cancer Institute
National Institutes of Health
U.S. Department of Health and Human Services

For Release on Delivery
Expected at 2:00 p.m.
Tuesday, March 23, 2010

Good afternoon, Chairman Pallone and members of the Subcommittee. Thank you for the opportunity to testify this afternoon. I am Dr. Anna Barker, Deputy Director of the National Cancer Institute within the National Institutes of Health (NIH), an agency of the Department of Health and Human Services. I also serve as the NCI Deputy Director for Strategic Scientific Initiatives, a program focusing on trans-disciplinary programs in strategic areas of cancer research and advanced technologies including programs such as: the Nanotechnology Alliance for Cancer; The Cancer Genome Atlas (TCGA); the Clinical Proteomics Technologies Initiative for Cancer and Physical Sciences-Oncology Centers. It is my privilege to appear before you today to share some exciting new advances in our understanding of a disease that is tragically familiar to each of us.

Unfortunately nearly everyone has a personal story to tell of the toll taken by cancer. One out of every three women and one out of every two men in America will develop cancer over their lifetime. In addition to the enormous physical and emotional toll it takes, cancer represents a huge economic burden to the U.S., amounting to over $200 billion in total healthcare costs in 2004.[1] NCI's key challenge is to understand the changes in the genome and associated biology that ultimately cause cancer in order to enable the development of more effective diagnostics, therapies, and prevention strategies that can be delivered to cancer patients.

Cancer is an extraordinarily complex disease of uncontrolled cellular growth, proliferation, and spread beyond the original tumor. Cancer is also an integrated network of signaling pathways

[1] Smith BD, Smith, E, Hurria, A, et al: Future of Cancer Incidence in the United States: Burdens Upon an Aging, Changing Nation. J Clin Oncol published ahead of print on April 29, 2009 at http://jco.ascopubs.org/cgi/content/abstract/JCO.2008.20.8983v1

and chemical interactions between the cancer and its human host. In fact, cancer is a large number of different diseases – over 200 – and many of these cancers may be comprised of a number of different subtypes, depending on which pathways are altered by changes in the cancer genome. These changes result in uncontrolled growth, and once cancer spreads (metastasizes), it is extremely difficult to control.

In the 1980s, new tools in molecular biology led to the discovery that cancer is a disease of genetic alterations – some are inherited and others after birth due primarily to environmental exposures. Clearly the complex of environmental exposures that impact all of us plays a major role in who gets cancer and the mechanism by which it occurs. For example, environmental factors such as radiation can cause changes in genes (mutations) that increase cancer risk – and these changes, called somatic mutations, are responsible for most cancers. Some people inherit genes that may predispose them to cancer – but many people who inherit these genes never progress to cancer. Therefore, it is critical to systematically explore how environmental factors combine with genetic variants to produce cancer. For example, in one such study, researchers are assessing breast cancer risk during puberty following specific environmental exposures.

The current convergence of advances in molecular biology and advanced technologies is already beginning to transform our understanding of the mechanisms by which cancer arises in humans. Increasingly, knowledge of the genomic changes in selected cancers is beginning to allow oncologists to categorize cancers based on technologies that define these alterations These molecularly-based subclasses of cancers are beginning to support the development of more

specific diagnostics through specific disease biomarkers – and drive the discovery of new cancer drug targets.

Ultimately, knowledge that is deriving from 21st century biomedical and cancer research will allow us to move from a "one size fits all" approach to disease – from a chemotherapeutic approach to cancer, for example – to safer and more effective interventions tailored to each individual's genetic makeup. NCI has developed a number of programs that are aimed at harnessing the power of molecularly-based interventions for cancer – ranging from studies that define specific changes in the genomes of cancer patients to nanotechnology-based diagnostics. As the cost of sequencing the human genome continues to fall and bioinformatics facilitates the availability of an electronic medical record that captures all of a patient's data, the next 10 to 20 years promises to transform the way cancer is diagnosed, treated, and prevented. The following is a brief sampling of recent advances in cancer research that highlights and supports the promise of personalized cancer medicine.

Recent Advances in Understanding the Genetics of Cancer

Well before the $1000 genome becomes a reality, advances from genome research are already leading to important new understanding of the role of genetic changes in a number of common cancers. For example, use of a technology called Genome-Wide Association Studies (GWAS) scans the genomes of many individuals to identify markers that may predict whether or not an individual may be susceptible to the development of a specific cancer. These studies have already shown that, generally, multiple genetic changes are required for an individual to be

predisposed to developing cancer. GWAS also is proving invaluable in identifying genetic changes that are predictive for how an individual may metabolize a specific drug. This is proving especially valuable in reducing side effects in patients.

The Cancer Genome Atlas

In 2005, the National Cancer Institute and the National Human Genome Research Institute launched a groundbreaking collaboration called The Cancer Genome Atlas (TCGA) to ultimately identify and catalogue all of the relevant genomic alterations in most types of cancer. TCGA employs state of the art genomic characterization and sequencing technologies, engages a network of multidisciplinary centers that involve over 200 experts in genomics and cancer biology and all of the data is placed in a public database. TCGA is the largest and most comprehensive analysis of the molecular basis of cancer ever undertaken which has faced and overcome a large number of technical and scientific challenges in its three year pilot period. In addition to achieving the goal of establishing the network and supportive structure for this first-ever large-scale, high-throughput cancer genomic program –TCGA has already produced scientific advances in the most common form of adult brain cancer (glioblastoma multiforme, or GBM), ovarian and lung cancers.

Because of TCGA's enormous potential, NIH chose it as one of seven "signature projects" to receive special emphasis using American Recovery and Reinvestment Act of 2009 (ARRA) funds. Utilizing the latest technologies and molecular insights, TCGA is expanding its scope, to explore approximately 20 additional tumors over the next 5 years – 10 in the two years of the

ARRA funding period. Results from TCGA will for the first time map the complex pathways involved in specific cancers which will re-define cancer targets and provide a rational basis for the development of new targeted diagnostics and therapeutics.

In 2008, the first major results of the TCGA pilot program produced a map of the three key pathways that are disrupted in glioblastoma – and defined the four specific molecular subtypes – paving the way for identifying the right patient for the right drug. Another exciting and unexpected finding points to a potential mechanism of resistance to a common chemotherapy drug used for brain cancer – which will influence clinical practice almost immediately. Although quite different from GBM, the TCGA team has discovered a large number of large scale genomic alterations called copy number changes in the DNA of patients with ovarian cancer. The value of TCGA will ultimately be measured in many advances – but perhaps one of the most striking is the value of the integration and analysis of multidimensional data to fully understand all of the genomic changes that impact the biology of specific cancers. We have seen unprecedented new investigations and interdisciplinary collaboration as these data become accessible to so many scientists. NCI has made a major commitment of ARRA funds to collect the tissues for TCGA sequence the genes and integrate and analyze the vast amount of data coming from the project. The rate-limiting step in TCGA is high quality samples; and NCI is working with survivors and advocates to ensure that cancers such as pancreas, melanoma, gastric cancer and other rare tumors are able to enter TCGA as soon as possible.

The Next Generation of Cancer Treatments

Prior to the emergence of the molecular diagnostic field, cancers were categorized solely by pathology, i.e., according to their appearance under a microscope. However, programs such as TCGA are changing this picture by producing molecular "maps" that allow scientists to determine how genes and proteins are interacting in a cell. This approach focuses upon patterns – gene and protein activity patterns – in different types of cancerous or precancerous cells. Molecular diagnostics uncovers these sets of changes and captures this information as expression patterns of the proteins that are coded for by the changes in DNA. Also called "molecular signatures," these expression patterns are improving clinicians' ability to diagnose cancer more specifically. This new approach extends to treatment as well as diagnosis, with the recent emergence of therapies specifically designed to hit a specific target defied by a molecular signature.

Targeted cancer therapies are drugs or other substances that block the growth and spread of cancer by interfering with specific molecules involved in tumor growth and progression. By focusing on molecular and cellular changes that are specific to cancer, targeted cancer therapies promise to be more effective than other types of treatment, including chemotherapy and radiation, and less harmful to normal cells. Molecularly-targeted cancer treatments are expected to yield the next generation of therapies that complement, or even replace, today's standard therapies for most cancers. The classic example is Gleevec, a small molecule drug that targets a class of overactive proteins formed due to a genetic change related to uncontrolled tumor growth.

NCI-funded research on Gleevec has shown it to be highly effective for treatment of chronic myelogenous leukemia and gastrointestinal stromal tumors.

A Coordinated Cancer Platform

NCI is initiating a number of key programs that will link the genomics of cancer with new ways to diagnose and treat the disease. The first step will be to ensure the availability of high-quality human biospecimens for cancer research, accomplished through the cancer human biobank (caHUB). TCGA and other high-tech initiatives demand the highest quality tissue, blood, and tumor samples, all rigorously and ethically collected, properly stored, and extensively annotated. caHUB, begun in 2009 after several years of work developing techniques and best practices, will be a national biobank: a repository for difficult-to-obtain biological materials and associated data that can be used for medical research and the sophisticated molecular assays necessary for identifying biomarkers that are key to understanding the biology of specific cancers.

Biomarkers and Proteomics

One of the key challenges in oncology is determining when and why cancer may recur in treated patients. Today, biomarkers, which are parameters that can be measured that reflect the biology of the disease, or in some cases the therapeutic effects of treatments, represent one of our best strategies to address these hurdles. These "biomarkers" of cancer can be measured through a variety of means, including dynamic imaging tests and laboratory tests on blood, tissue, and other biologic samples. The measurement of these parameters reflects changes in genes, proteins, or some combination that tell a story of the state of the cancer in a patient. The NCI is

actively investigating biomarkers through TCGA, an initiative in clinical proteomics, and working with other sectors through several partnerships. One such unique collaboration is the Biomarkers Consortium, a public-private partnership organized and managed by the Foundation for the NIH (FNIH) with funding provided by philanthropic groups and industry. The Consortium is currently investigating fluorodexyglucose-positron emission tomography (FDG-PET) as a potential biomarker in clinical trials for lung cancer and lymphoma. These studies could have significant impact on patient management by validating a tool that can identify response to treatment and facilitate drug development.

A related area of examination involves determining what proteins are expressed in patients as a result of the various genetic changes identified by large-scale genomics programs such as TCGA. NCI has undertaken a program called the Clinical Proteomics Technology Initiative to develop needed standards for the discovery of proteins, so they can serve as biomarkers. There are clearly large numbers of proteins that are important in the development and maintenance of cancer, but the technologies, reagents and assays to measure them must be standardized and transferable across laboratories to maximize benefit to patients. Proteins are likely our best hope to identify cancer early from small amounts of blood – meaning they offer great hope to improve screening assays for a number of cancers. NCI is assembling new transdisciplinary teams to harvest the promise of biomarkers for both cancer diagnosis and new targeted drug development through a number of strategies – one of the most promising and exciting at the intersection of molecular biology and advanced technology is the area of nanotechnology for cancer. Cancer's complexity and the numbers of biomarkers that will be needed to diagnose and treat cancer will require new experimental platforms that can capture and simultaneously analyze large numbers of different parameters that define the state of the cancer.

Nanotechnology

Because of their small size, nanoscale devices can readily interact with biomolecules on both the surface and inside cells, giving them the capability to detect disease and deliver treatment in ways unimagined before now. Nanotechnology has the potential to enable all areas of cancer research including improving molecular imaging, early detection, cancer prevention, and treatment. In 2004, the National Cancer Institute established the NCI Alliance for Nanotechnology in Cancer program. The network is built on a strong foundation of superb science and technology development and is designed to accelerate the application of nanotechnology to remove some the major barriers in clinical oncology and basic cancer research.

One example of an exciting advance in nanotechnology involves the use of gold nanoparticles coded with "barcode" DNA to allow ultrasensitive detection of cancer biomarkers – six times greater than conventional assays. The technology has already been translated to bedside and has demonstrated preliminary success in clinical evaluations of the prostate cancer samples of approximately 400 patients, with a larger study currently being planned. Other advances that have derived from this multi-disciplinary program include a nanotechnology platform to detect multiple biomarkers of brain cancer and delivery of nanoparticles that contain a promising new cancer therapy called small interfering RNA (siRNA) directly to cancer cells. This type of drug delivery has already shown promising results in a small Phase I study of pancreatic cancer, a highly lethal type of cancer for which there are few treatment successes. The Alliance has placed significant emphasis on translating nanotechnology to patients, and as a result over 50 companies have been formed from these efforts over the past 5 years.

A New Framework of Physical Sciences

Understanding cancer at a fundamental level depends on more than just defining the genomic changes that characterize these diseases, as cancer occurs in space over time. To build a new framework for the advances and data that are deriving at a dizzying pace from present day cancer research, the NCI has created an unprecedented scientific network called the Physical Sciences-Oncology Centers (PS-OCs) program. These centers bring together teams of experts in the physical sciences with cancer biologists and oncologists to work together in innovative ways to understand how the physical forces in cells and organs impact on the expression of genomic changes that drive cancer biology. The fields of physics, mathematics, chemistry, engineering and biology are all working together to ask questions such as: How does evolution affect the way we look at cancer? How is information transferred and translated in cancer cells? What impact do the physical laws that govern the universe have across the scales ranging from molecules and atoms to whole organisms? It is anticipated that the PS-OCs will generate new bodies of knowledge that define the physical, chemical, and engineering processes that operate in cancer. Some examples of work already in progress at the POCs include examination of the physical dynamics of cancer progression, selective metastasis and specific mechanical properties of cancer cells. Studying cancer cells and tumors in terms of their physical properties will open new areas of research to drive the development of better diagnostic and treatment strategies for cancer (e.g., physical properties as potential cancer signatures).

We at NCI are proud of the progress we have made, excited by the opportunities that lie ahead, and challenged by the daunting amount of work that must yet be done. We are dedicated to

achieving a future where the shadow of cancer is removed from our lives and those of our children and grandchildren. This increasingly seems like an achievable future - as thousands of dedicated intramural and extramural scientists work tirelessly to make personalized cancer medicine a reality for every American.

Thank you, Mr. Chairman. I would be pleased to answer any questions that the Committee might have.

Mr. PALLONE. Thank you, Dr. Barker. We are going to take questions from the panel beginning with me, and I have to say that as much as I am tired and I know many of us are from the long weekend, I am also very excited by your testimony. You mentioned nanotechnology, which I think is so important for the future. We just had a—well, not just but within the year or so I went to an all-day conference at Rutgers on nanotechnology and some of the things that were really interesting that they were doing, and when you were talking about your relatives, I feel the same way, you know, my mother with pancreatic cancer, father-in-law with brain cancer. These deadly cancers are just around us, you know.

When I went to Johns Hopkins with my mom, I was surprised to find out how much of a hereditary factor there was. Now, I don't think it was that significant. I think they said 10 or 11 percent that they could say were hereditary, which isn't really that much, but the first day we arrived and they were looking at my mom, they took myself and my brother into a separate room and said by the way, there is a certain hereditary factor here, and they put us in some kind of a genetic bank or something to get back to us if there are breakthroughs because of the genetic factor, and I was of course—the first question they asked, Do you have a history of this in your family, and my mother actually was adopted so we had absolutely no information to relate to them other than her. But I know that all these things you mentioned are so important, really. I can't stress that enough.

I mentioned in the opening about this genome atlas that I guess examines genetic material of various tumors and looks into gene mutations and different things genetically, and I know that you have some new findings in that respect with regard to ovarian cancer, but this atlas I guess from what I understand gets updated and may be expanded, I suppose, to include some of these other deadly cancers, so I wanted to ask you, you said it is going to be expanded to include 20 additional forms of cancer over the next 5 years and NCI will look at half of these within the next 2 years. So tell me, what is the basis for selecting the 20 additional cancers that you research and what is the timeline for that selection? How is that process gone about?

Ms. BARKER. It is an excellent question. It turns out that as I said, the biggest issue we have with doing these very sophisticated studies is the availability of the samples. So as you can imagine, we are looking everywhere for samples, and to give you some feel for how difficult this was for GBM, glioblastoma, which is this adult brain tumor we did first, we had to look everywhere in the United States and outside the United States to get enough samples to actually do that study. It turns out that only about 30 percent of those samples qualify, and that is not a bad number for most of the samples in the country right now. Why is that? Well, people collected these samples for many years. They weren't thinking a lot about when they collected the samples the advanced technologies we would be using today. So in terms of selecting cancers for the atlas, the first priority is, are the samples there, are they available, and so we are doing very well. We are moving ahead on lung cancer. We are just introducing kidney cancer into The Cancer Genome Atlas, already have actually. Colon cancer is already being

introduced into the atlas. We have cervical cancer and potentially gastric cancer to come into the atlas. Now, the latter one obviously is a rare tumor and so we are having to look in many, many areas to find these samples. By and large, or at least as we move forward, we think that we will also be able to prospectively collect samples and that will be driven mostly by which tumors are prevalent and which ones we can actually lay our hands on in the most rapid fashion, but we can collect tumors prospectively now and actually make sure that they meet our very stringent criteria. So going forward, we are going to use a combination of retrospective samples and prospective samples.

But it turns out to be the biggest barrier we have. I mean, who would have guessed going into this that this—what most scientists would have considered a trivial issue is non-trivial and it is going to be actually the basis for personalized medicine overall so as a country we have to face up to the fact that we have to start treating our patient samples as well as we treat our patients, if not better, because they are going to actually define what personalized cancer medicine can be. So at NCI we started a lot of initiatives including best practices for how you collect samples and store them and actually what the stewardship is going to be of those samples. We think it is critically important.

Mr. PALLONE. I would just ask you, I know that I and several members, maybe all the members of the committee, are interested in tracking any progress that you make on this cancer genome atlas, and keep us abreast of your efforts as you go along because this is of interest to me and to all of us. We appreciate it.

The gentleman from Illinois, Mr. Shimkus.

Mr. SHIMKUS. Thank you, Mr. Chairman.

Dr. Barker, welcome and we are glad to have you here. The budget request this year is $5.26 billion. It is a $163 million increase over fiscal year 2010. Add to that $1.26 billion provided by the stimulus bill. How do you go about apportioning out—we as members have disease groups all the time that descend upon us, and it is a sad kind of a food fight. So how do you apportion research dollars to cancer, the various cancers?

Ms. BARKER. With great difficulty.

Mr. SHIMKUS. Like we do, I think.

Ms. BARKER. I think at the last count there were a little over 400 survivors' groups, I think, relative to cancer of one sort or another, and so what we try to do is to look at what is really promising in terms of what is going to enable cancer research that will actually be translatable to patients and backing into that what is really going to inform the biological space that will allow that to happen. I mean, if you think about what is really required for cancer, it is to understand the mechanisms that actually drive this disease and that is understanding the biology, and that has taken some time and we have built a really strong base for that. So what we try to do at NCI is obviously about half of our portfolio is driven by what we call individual investigator-initiated research, which is the strongest part of what we still do in science today. It is innovative. It is driven by innovation and individuals' ideas. The rest of our portfolio is dedicated to things like our cancer centers, our specialized programs of research excellence, our clinical trials infrastruc-

ture, et cetera. So cancer is a very, very big problem in the country so there is a fair amount of infrastructure that we have established in the early 1970s, actually the early 1960s.

The other thing we try to do is the area that I lead up, the NCI, through the Center of Scientific Initiatives, we try to focus on areas that we think are enormously promising like cancer genomics or nanotechnology or proteomics, the biospecimen issue, cancer bioinformatics. These are all things that we have tried to focus on over the last several years.

Mr. SHIMKUS. If I can, because I have only got a couple more questions that I want to ask, but I appreciate that. But I want to follow up on——

Ms. BARKER. So balance, I guess, is my answer.

Mr. SHIMKUS. I know, I expected not an easy answer of how you do it.

In the appropriations bills of last year, we addressed both sides of the Hill. We encouraged NCI to put a high priority on GI cancers in people age 40 and under and for NCI to consider developing an interconnected gastrointestinal cancer biorepository. Where are we at on that, and can you give us any response as far as what progress has been made, what factors are you considering to determine if a GI repository should be developed? What else can we do? Obviously that is a particular focus of this hearing and my interest.

Ms. BARKER. I think the GI spores are really well under way and they are collecting their samples and so we will have samples from this specific cancer, so I think that is going alone fine. The other thing that we have done just recently is, we held a meeting just last week on infectious agents in cancer, and as you know, gastric cancer especially is related to H. pylori, an infestation of a bacterium in the gut, but not all stomach cancer is caused by H. pylori, and you heard about one of those today, I am guessing. So we are trying to also now investigate other areas that are related to intestinal cancers other than just the kinds of normal things we have been looking at over the years, specifically, infectious agents.

Mr. SHIMKUS. What about the cancer Human Biobank, which seems very promising? Can you talk about that?

Ms. BARKER. Yes. We had hoped to—we were planning on launching that probably next year, but with the aid of the ARRA funding, we were able to launch it in 2009 with about $60 million. So it is under way. We expect it to be well under way in the next 3 years. Certainly by the end of the ARRA period we will have it well under way and samples are already beginning to flow in. The infrastructure is being created. So thanks to the ARRA funds, we were able to get it under way at least a year earlier than we would have been able to do it before.

Mr. SHIMKUS. And I appreciate your quick answers. I still have 20 seconds left.

There are some difficult biological materials to obtain in this process. Can you identify some of those?

Ms. BARKER. Well, any of the rare tumors basically. I mean, the rare tumors are really hard to get. Sometimes it is because of standard of care. Sometimes it is because people hang on to their samples; they are very precious and they don't want to share them. So I would say any time that we can encourage and I think really

engage the advocacy groups to help us to collect these samples, that is where we should be focusing.

Mr. SHIMKUS. Thank you, Mr. Chairman.

Mr. PALLONE. Our vice chair, Ms. Capps.

Mrs. CAPPS. Thank you.

I found myself, Dr. Barker, getting goose bumps while you were giving your testimony. I think it is very stunning what you were telling us, and I would like to have you use my time to talk more. The whole notion of personalized medicine is kind of floating around there. You are kind of pinpointing it so we can know, but you mentioned Cancer Genome Atlas, and is that what Mr. Shimkus asked you about?

Ms. BARKER. That is what the chairman is talking about.

Mrs. CAPPS. Yes, and the Human Biobank would be part of that atlas?

Ms. BARKER. Separate ideas and separate concepts and separate initiatives but very much related to each other because the cancer Human Biobank will collect these samples and make them available to The Cancer Genome Atlas.

Mrs. CAPPS. And then I guess the part that is so intriguing to me, you could talk on and on, hours, I suppose, just about that——

Ms. BARKER. And I am Irish, so you don't want to do that.

Mrs. CAPPS. But maybe another time. I have a feeling we are just getting into this, and I feel myself wanting very much to be educated.

I want to try something on you because there is a—we found that there is a piece of our health reform language that is about research on cancer, and the part that intrigues me is the Cures Action Network, another new initiative. I am just quoting from the language of the legislation. "New initiative created in the legislation, an effort to help translate promising discoveries into cures with an emphasis on priority health issues where incentives for development are inadequate guided by"—this is all to be—"guided by a board of scientific experts and venture capitalists, individuals who have experience identifying promising projects. These experts are teamed with advocates who can represent the needs of patients. How would you see what you do there? I sort of call that pure research, if you will, and then also with the atlas and those samples, how can these results, your results, be translated more quickly to treatment and cures?

Ms. BARKER. So I think it is an end-to-end solution. I mean, basically you are starting with the samples. You are going through The Cancer Genome Atlas identifying all of these pathways that are disrupted. It allows you now to sort of attack that valley of death where things get lost and we don't have a real opportunity to take things to the next step. I think it is a very exciting idea.

Mrs. CAPPS. Will you be doing that or do you see yourself collaborating? I don't mean you personally but——

Ms. BARKER. Probably both. We do a lot in translational research already but this allows actually—if I understand it correctly, it allows for more direct relations and public-private partnerships to occur, which is something that is missing now in terms of really moving these new treatments into patients. I think that is long

overdue and I think we can make good use of both the mechanisms and obviously the resources.

Mrs. CAPPS. So we need to stay in touch with you. I am suggesting this to my chairman at the same time. This is a work in progress, both where you are and also this is a brand-new piece of legislation, to find out those ways that those connections should be made and using the advocacy groups because they are so useful to all of us.

Ms. BARKER. Right.

Mrs. CAPPS. And then connecting to the private sector.

Ms. BARKER. Once you know which of these pathways is disrupted and which of these pathways are driving a specific cancer, then you are going to have to be able to make a new intervention or a drug, and The Cancer Genome Atlas is already sending the private sector in a new direction to discover new drugs. We are already seeing changes in the way that they are actually doing business. So the government is actually having a lot to do with sort of redirecting the way discovery is going to occur in the future.

Mrs. CAPPS. Again, it is very exciting. I have 48 seconds left that is yours. What else would you like to tell us in that very short time?

Ms. BARKER. Well, you can't say much in these prepared statements so the couple things I would say is that The Cancer Genome Atlas is an example of something that is really changing science. I mean, it really is bringing hundreds of people together to look at a disease as complex as cancer and integrate all the data and make it available.

Mrs. CAPPS. Let me just interrupt. Say there is someone who walks into a doctor's office and they take a biopsy and it comes back, and that is the point that I think we all can relate to. How does what you are talking about connect there in any way?

Ms. BARKER. So in a few years—when we started The Cancer Genome Atlas it was a couple hundred million dollars to sequence a cancer genome. It is now down to tens of thousands of dollars, and I would predict in as little as 5 years it is going to be down to less than $5,000. You get your genome sequenced, and we are going to know what the disruptions are and we are going to know what subclass of cancer that you have and you will get the right drug. You will not be treated with a generic sort of treatment. You will get the right drug for your subclass.

Mrs. CAPPS. And you will have it in the bank, or someplace it will be?

Ms. BARKER. Well, if we can move ahead quickly on the things that you just talked about in terms of developing these new treatments, absolutely. So I think it is going to change the way medicine is practiced completely.

Mrs. CAPPS. Stunning. That is all I can say. We have to do this more, Mr. Chairman. Thank you.

Mr. PALLONE. I realize that this is a subject of great interest and we will look into possibly doing additional hearings. We only have 6 months left, though, before the end of the session.

The ranking member, the gentleman from Texas, Mr. Barton.

Mr. BARTON. Thank you, Mr. Chairman.

Thank you, Doctor, for appearing. Dr. Andy von Eschenbach is not only a professional acquaintance but a personal friend and has helped me in treatment decisions for members of my family, so he is somebody that I have a lot of respect for. He has told me that with the proper approach and proper funding, we could actually find a cure for cancer in the next 15 years. Do you share that view?

Ms. BARKER. I think it depends on how we define "cure." I think what will happen in this field, and Andy and I have discussed this on many occasions, is we are going to learn enough about these cancers to actually be able to treat them and have people live normal lives, and if you call that a cure, then that is a cure, but I think if you can stop the growth of a cancer, and let us just say even the cancer comes back, much as you see with AIDS patients, if you now can go in with another treatment that is equally effective and someone gets another 10 years, let us say, which is what is happening with breast cancer patients today, for example, then you are going to live out your life normally and die from something else. So that is the road we are on with cancer. Cancer is an extraordinarily complex disease, probably the most complex disease we have ever undertaken, but we are going to understand it well enough to be able to control the pieces that need to be controlled on a time frame that will allow you, I think, to live a fairly normal life. So I think that is the future.

Mr. BARTON. Now, I don't have the article in front of me but several months ago I believe Newsweek had a cover story about the war against cancer and was the wrong battle being fought. The article was not necessarily negative but it did raise some questions. Are you familiar with that article?

Ms. BARKER. Yes.

Mr. BARTON. What is your general view of that? It implied to me that we are spending a lot of money and kind of doing things the conventional way, which is somewhat contrary to what you just discussed with Congresswoman Capps.

Ms. BARKER. Well, those that know me know that I do very little in a conventional way. I mean, most of the programs that we started at NCI are pretty unconventional, whether it is nanotechnology or The Cancer Genome Atlas or some of the other things we have done. You know, this happens three or four times a year that we have a national story that says, you know, why aren't we winning the war on cancer, and, you know, I think it varies from time to time as to what the issues are, but I think we do have to look at these diseases differently. If we can actually balance the amount of individual investigator-initiated research with some of these larger programs, I think we will proceed faster. So I think we have to come up with sort of piece coexistence of programs that enable everybody in individual investigator-initiated grants.

Mr. BARTON. But you do have a mechanism with NCI to review that type of——

Ms. BARKER. Yes.

Mr. BARTON. So there are people thinking about different ways to do things?

Ms. BARKER. Yes. I think it is the biggest change that we are going to have in cancer research and ultimately in the way products are developed for cancer patients. The one thing I didn't say

but maybe it is obvious to everybody on the subcommittee is that cancer is digital, it is knowable, it is information. Think about it. I mean, you know, you pick up this device or another now and it is turning over every 5 years or it seems like every 2 months you are getting a new device. Well, once we digitize cancer, which is what we are doing with The Cancer Genome Atlas, going back to the Human Genome Project, that is what the Human Genome Project taught us, that DNA is digital, so as you begin to learn the information about cancer, you are going to be able to move much more rapidly, I think, and I think if cancer is knowable and we can decipher all the genes that cause these cancers and make them available to everybody, that is going to move the field exponentially.

Mr. BARTON. Now, one of the things that we did in the NIH Reauthorization Act several years ago was create a common fund that requires a certain amount of money each year to go into this fund and requires those that wish to take advantage of grants from that fund to work across different areas of NIH. That fund has been in existence now I believe for 2 years, maybe 3. Is that type of approach something that would tend to help the approaches that you are focusing on at NCI?

Ms. BARKER. They are very similar, and some of them have actually come from the common fund or enabled the common fund as many of the NIH institutes actually work in this way. I think the common fund is a great idea. I know Dr. Collins is now looking for new ideas for the common fund, so yes, they are very complementary and I really commend you for the common fund and the idea. It has been very, very helpful.

Mr. BARTON. And my last question, we are bombarded every year on this committee with requests from advocacy groups for special bills for specific diseases and specific cancers, and each group, whether it is the breast cancer group or the cervical cancer group or the prostate cancer group or the autism group or the Alzheimer's group or you name it, the heart group, theirs is always in their minds the priority that we should fund. What is your advice to the Congress on how we should handle those kinds of bills?

Ms. BARKER. So we see the same groups, and I think increasingly I believe that understanding the biological space or understanding the biology that drives cancer and other diseases is going to be critical to everybody. So I think that what we do—and we are learning so much now from The Cancer Genome Atlas that says that, for example, GBM, the pathways that are disrupted in GBM are going to look like the same pathways only a bit different in terms of the quantity of the genes and the exact numbers of genes that are actually disrupted in ovarian cancer so there are going to be some interesting overlaps here that are going to tie these cancers together. So I would encourage us all to begin to unravel that mystery that is cancer as opposed to, you know, what is prostate cancer, what is breast cancer, what is this cancer, what is that cancer. I think that is all going to converge and it is starting to converge now. So we need to work together to fill in the biological space and find out what drives cancer, and I believe it is going to help all these diseases.

Mr. SHIMKUS. Will the gentleman yield?

Mr. BARTON. Yes, I would be happy to yield.

Mr. SHIMKUS. Just to follow up. Thank you, Dr. Barker. In talking about again the cancer Human Biobank, how do we envision researchers across the board having access and using that? It is kind of tied to the same question based upon research. Because a lot of the advocacy groups are also doing research that I am not sure how—if we are getting access to that information or how that all works out. Can you in the last minute of——

Ms. BARKER. So in the last minute—it is a complex issue. The cancer biobank is just getting underway. The Human Biobank is just getting underway. But what we want to do is, we will have to prioritize access because some of the samples will be quite precious. So what we envision is having a board for the biobank that will actually prioritize requests and make samples available and information available on a priority basis but we generally will also offer services to investigators who are just looking for or need samples and so I think both of those will be possible in the biobank.

Mr. SHIMKUS. And how do we incentivize people? We will have testimony in the next panel of someone with a rare cancer who when they had the availability there was no place to go. How do we encourage a place to go?

Ms. BARKER. For?

Mr. SHIMKUS. I am not a doctor, but the tissues from this stuff. Some of these rare diseases, they are rare. It happens, it is gone and then you have no place to get the tissue to go to.

Ms. BARKER. Well, I have proactively—for The Cancer Genome Atlas, the first three choices were rare tumors basically: squamous cell carcinoma of the lung, ovarian cancer and GBM, GBM being the toughest. We spend a lot of time thinking about and working on these highly lethal tumors, and we will do more. The Cancer Genome Atlas will allow us now to look at these tumors. We are going to need help with getting the samples, and this is where the advocacy groups can really play a role, and I spoke just recently with the Deadly Cancer Coalition and we are working with several of those groups now to get those samples into The Cancer Genome Atlas. So I think it is working.

Mr. BARTON. Thank you, Mr. Chairman.

Mr. PALLONE. Thank you.

The gentlewoman from the Virgin Islands, Mrs. Christensen.

Mrs. CHRISTENSEN. Thank you, Mr. Chairman. Thank you, Dr. Barker.

It is very exciting. It was very exciting to read and to listen to your testimony today. You focus a lot on of course the genomics and the molecular biology, but when you talk about bringing all of the experts together and all the data together, does that also include experts on environmental and psychosocial? Does that come into the discussion as well?

Ms. BARKER. Yes, because we are collecting data. I mean, I didn't have time to mention but all the samples we are using are actually from patients that are extraordinarily well characterized. They have to be to get into The Cancer Genome Atlas. So we have survival data on these patients, exposure data, et cetera. So as we go through these processes and learn more and more about these cancers, we will be able to begin to dissect out some of the questions

relative to environmental exposures. I know Dr. Collins is planning a larger initiative in that regard to look at longitudinal data in terms of looking specifically at lifetime exposures in patients. We don't have that capability right now.

Mrs. CHRISTENSEN. Thank you. A Dr. Foege, I guess is how that name is pronounced at CDC, is quoted as saying, "The challenge to genomics is to overcome the inequitable allocation of benefits, the tragedy that would befall us if we made the promise of genetics only for those who could afford it and not for all of society." So how do we incorporate population-level considerations of personalized cancer medicine and ensure that the emphasis on molecularly targeted therapies won't exacerbate the health disparities?

Ms. BARKER. I have lots of friends who always ask me this question—Harold Friedman from New York, who was at the NCI and actually founded our disparities program. I honestly think that this is going to do a lot to remove many of those barriers because one thing we are finding actually is that early on I think people assumed that maybe if you take the African American population, for example, that their cancers look the same as other cancers, and in fact, it is likely not to be the case. So we are studying these cancers now and we have cohorts of these cancers where we will be able to determine if there are differences, if there are inherited differences and if there are population differences. We are also working across borders with several countries. Almost all the countries now have actually—The Cancer Genome Atlas has become very popular. It is being cloned in lots of countries now. There is a meeting going on in Spain today that I was supposed to be at, but the United States, we are actually providing all these countries with the construct for how we are doing this. So there are going to be lots and lots of data on many countries including Africa where we will be able to sort out a lot of these differences. So I think actually this could reduce the digital divide and I think it will because I think we are going to know enough to do what is right for all these populations, not just for some.

Mrs. CHRISTENSEN. And are you doing anything, any specific research on the more aggressive forms of breast cancer that black women are disproportionately likely to get? I noticed that in your plan you say you are using ARRA money to look at health disparities and really target these kinds of issues.

Ms. BARKER. Right. So you are talking primarily about triple-negative breast cancer, which is a devastating cancer and it is quite high in African American women and quite devastating, and we have a number of programs in the NCI looking at that. We just launched a new program which I don't have time to talk about last week actually called the I–SPY 2 trial which is actually a program to look at breast cancer in the neoadjuvant setting. Patients are going to have surgery. Many of those patients will be triple-negative breast cancer patients but the idea is to use an adaptive trial and test a large number of agents which we have not been able to do before and move drugs through very quickly. So I think we have got a lot of attention on that disease right now.

Mrs. CHRISTENSEN. Great. We could probably look that up on your Web site?

Ms. BARKER. Yes.

Mrs. CHRISTENSEN. One last question. I notice that you have a center to reduce cancer health disparities at the NCI. I would like to just know how do you relate and interact with the National Center for Minority Health and Health Disparities research.

Ms. BARKER. Very close interactions, and I think our center for reducing health disparities is a real flagship for all of the initiatives that are ongoing around cancer and disparities, and everything from our centers, you know, where we are actually training and bringing in new investigators, minority investigators especially, to some of the special research programs. It is really quite a success.

Mrs. CHRISTENSEN. Thank you.

Thank you, Mr. Chairman.

Mr. PALLONE. The gentleman from Indiana is recognized for 8 minutes. Mr. Buyer.

Mr. BUYER. I thank the gentleman.

Ma'am, when you were holding up your cell phone, I couldn't help but sense that as you talked about the genome and how fast our discoveries are moving, I am going to ask a question. I don't know the answer to this but I am going to do a systems analytical, and this would be our delivery systems. Sometimes our delivery systems can be caught in time. It is logistics, it is who is doing what in the preparation of what you described as that proper drug. So if you take yourself back actually maybe 15 years ago, some of the larger pharmaceutical companies did some discoveries and they held the drugs and they realized that they couldn't keep up and some would then spin them off either into the compound pharmacies or some nuclear pharmacies and they would be responsive to some cancer hospital or clinic or particular doctor, and so we have a unique delivery system on how that proper mix is getting there. Is that delivery system keeping pace in order for us to do that specialized proper care as you envision?

Ms. BARKER. Well, that is a tough question.

Mr. BUYER. I don't know the answer to it either.

Ms. BARKER. Well, I think I do know the answer. I mean, I think the answer is, as of now I think we are keeping pace pretty well because the targeted drugs we are using in cancer research today, drugs like Gleevec and Avastin, are getting to patients. I think the bigger question is, when we have hundreds of these kinds of drugs and you are going to be hard-pressed to know everything there is about every one of these drugs, will people keep pace then. I think that information is going to change and the amount of information available is going to change at a pace that will allow people to keep up. But I think delivery is going to be the major challenge. I don't disagree with that. I think it is a huge systems challenge.

Mr. BUYER. I asked that question from a systems analytical approach. We have a regulatory—all these regulations that are in place. Take, for example, a doctor that—you said the personalized sampling increasing personalized care. So when the doctor now knows what my patient's needs and requirements are, sends off to someone for a particular proper drug mix and it is then placed into the delivery system whether it is FedEx or UPS. Now it comes under some other regulatory schematic and maybe it is held in FedEx, it is brought in overnight and it is now held in a different

place because of the regs and it has a time—sensitive in time. And now it may sit there for 2 days, and by the time doc gets it, how stale is the mix with regard to toxicity? You know what I am saying? I look at our system here and you say OK, the more we personalize, the better care we can get, but are we doing what we need to do because by the time that proper mix gets, is it going to do what the doc wants. This is my question.

Ms. BARKER. Well, I am not funded for FedEx but I can tell you right now that the delivery of drugs in this country is a very high priority for the pharmaceutical companies that actually send them to physicians, and the delivery thereof is highly monitored by physicians because everybody knows that many of these drugs are actually not terribly stable. They have to be kept at certain temperatures, et cetera. I don't think we see that problem very often but to your point, as you have more and more of these, it could become more of an issue. So it is a systems problem.

Mr. BUYER. That is why I am asking the question. If this is where we are going, when you say what is our over-the-horizon vision, will our delivery system match your vision. Maybe I should——

Ms. BARKER. No, and I think—in oncology we have been working on that for many years and I think, you know, because we do have an oncology community, especially a community of physicians that are very, very good at keeping track of the information. I think it will morph according but it is going to be a huge challenge, I mean, for all diseases, not just cancer actually.

Mr. BUYER. I yield to Mr. Shimkus. Are you good? I yield back my time. Thank you.

Ms. BARKER. You are welcome.

Mr. PALLONE. Thank you. Recognize the gentlewoman from Florida, Ms. Castor, for 8 minutes.

Ms. CASTOR. Thank you, Chairman Pallone, very much.

Dr. Barker and everyone at the National Cancer Institute, thank you very much for all that you are doing on cancer research and that vital—it is fundamental to American families and the struggles they have every day with cancer, and as my colleague said, there is just no one that has been unaffected.

I am particularly enthused about your focus on genomics. I represent the Tampa Bay area that is home to the Moffitt Cancer Center, and they are really at the forefront of the national genomics project and have been educating me over the past few years, and let me tell you, even the Recovery Act money now, the NCI money, the Recovery Act that has gone to even greater research dollars and jobs, kind of high-wage jobs we want in our community and this new emphasis on genomics, and we also get support through the defense bill to even bolster the NCI funding. Moffitt launched their database in 1999 and they have been gathering that genomic data, the genetic profiles and the clinical history data for each enrolled patient, and I guess the next big step was to reach out to other researchers and other hospitals and begin that important partnership on the biorepository. So we are spreading out across Florida through the Moffitt, and I would like you to expand a little bit more on that data collection and the sample collection. I know the Moffitt, we have got 50,000 cancer patients so far have con-

sented to have their clinical data and molecular profiles added to the database and that is going to be accessible to physicians, researchers and the patient themselves. They call it the total cancer care database that then flows into the personalized treatment that you are talking about.

But could you drill down farther on the details of collection and the challenges that we are going to face? You did mention in passing the protocols, ensuring that the sample meets your standards. Talk a little bit about that in the data collection.

Ms. BARKER. So first of all, I just have to say that Dr. Bill Dalton at the Moffitt Center is one of the prime examples of a state that has actually put their whole state ahead. I think of the curve here. It is an amazing amount of work that they have done and they have actually taken a lot from The Cancer Genome Atlas directly and implemented it in Florida, a very commendable effort.

In terms of some of the specifics, I mean, we have established at the NCI a set of best practices guidelines which I think have enormous merit for all investigators to be held accountable to, and so we are working on that, but I think in terms of the specimens themselves, they are very prescribed SOPs, or standard operating procedures, for how long in the operating room, you know, when it goes into storage, how it's stored, how you access it, the kind of bioinformatics platforms that you need to keep track of the samples, the consent that goes with the samples, and in this era of genomics they are quite different consents for patients than they were before. So there is an enormous amount of information. Moffitt has all of that, and they have been using our standard operating procedures now for a couple of years.

Ms. CASTOR. So you have got how many research institutes that are part of genomics data gathering right now?

Ms. BARKER. Well, there are literally hundreds of those, but for The Cancer Genome Atlas, there are probably 20 different institutions that are contributing.

Ms. CASTOR. And then is it their responsibility to use your framework and the SOPS——

Ms. BARKER. Yes.

Ms. CASTOR [continuing]. To continue the outreach to gather those samples?

Ms. BARKER. That is correct, and what you want is a standardized approach so we are all talking about the same things when we get to experimentation. Now, I thought you were going to ask a different question, and that is——

Ms. CASTOR. What did you think I was going to ask?

Ms. BARKER. That is that there is something about these samples—we are actually doing some research on what causes changes in samples. We don't know. I mean, patients undergo anesthesia, all kinds of things in the OR. We don't know what impact that has. We have undertaken some research at NCI to try to figure that out. It is an interesting problem.

Ms. CASTOR. How often does that occur? Is that standard, happening throughout all the samples?

Ms. BARKER. Well, it is actually—we have just undertaken that research in the last 2 years. No one has ever asked the question before. No one has ever said, what is the impact of anesthesia on

a cancer sample, I mean, until I hired a pathologist to come to NCI, who I have known for a very long time, and the first question she asked me was, how do you know the anesthesia patients get is not actually responsible for the biomarkers you are measuring versus the biology itself. Nobody ever asked that question before. So we are doing research now to answer that question but it is a very important question, along with several other questions that we are trying to answer, so it is an interesting set of questions driven now by personalized cancer medicine because we want to know what those samples are actually telling us about the biology.

Ms. CASTOR. And as you build this digitized database, I guess it is the molecular footprint for each of these cancers?

Ms. BARKER. Right.

Ms. CASTOR. And then you have control factors based on all sorts of considerations. Can you state again in plain language what that means? Maybe go back to the latest ovarian cancer findings, what that means to a patient now and in the future.

Ms. BARKER. So what that will mean is that take ovarian cancer. We have identified three subclasses of ovarian cancer, very clear molecular subclasses. So we are going to know which drugs work on which subclasses. We already have survival data that says these drugs predict survival and these subclasses, at least two of the subclasses, so you are going to know as a patient what you should get, and you are also going to know as a physician whether or not anyone should get any drug basically. You know, right now we generically treat everybody with the same drug. If you have ovarian cancer, you either get a platinum-based drug or you get Taxol, and you may benefit from one, you might benefit from both, you may benefit from neither. So now we are going to be able to tell you which of these you are going to benefit from and the physician will have some idea about the expected longevity. As we go forward, I think you are going to see more and better cancer therapeutics for those specific subclasses, and that is the whole goal of The Cancer Genome Atlas. So patients can benefit very quickly by actually being put on the right drugs, I mean, going into the right clinical trials, putting patients in the right trials and then ultimately treating patients with the right drugs.

Ms. CASTOR. And they benefit by submitting their samples?

Ms. BARKER. Yes, and increasingly every patient coming in for any diagnosis of cancer should have their sample collected, stored and kept, period.

Ms. CASTOR. Well, again, thank you very much for what you are doing. I will pass along to Dr. Dalton that you have kudos of the Moffitt.

Ms. BARKER. He is a great catalyst.

Ms. CASTOR. Thank you.

Mr. PALLONE. Thank you. Now, we have our last series of votes, a 15-minute and a 2-minute—I am sorry, a 15-minute and two 5-minutes.

Mr. Gingrey, you are next and you have 8 minutes. Do you want to try to use it?

Mr. GINGREY. Why don't I take a shot at it, Mr. Chairman?

Mr. PALLONE. All right. You are recognized. The other members, if you want to go vote and then we will——

Mr. GINGREY. I think if you don't mind, Mr. Chairman, and I appreciate, I will go ahead. This is so interesting, I hate to lose my train of thought.

Dr. Barker, thank you so much for being with us and sharing this information. I have a medical background, but I can tell you, on this issue I don't know any more, maybe less than my colleagues on the subcommittee. You talked a good bit about the state of the art in regard to the TCGA and being able to figure out subsets. You just mentioned, I think, in ovarian cancer and being able to tailor specific drug therapy depending on the subset, which I think is fantastic, and this is a great thing and I am glad that we are continuing to fund it, and I will certainly continue to support that.

I want to take it maybe a step further into the future and maybe you are already there, you haven't talked about it yet, but, you know, there was a study in the New England Journal of Medicine last year, I think it was called the REVEAL study. Are you familiar with that, Dr. Barker?

Ms. BARKER. Yes.

Mr. GINGREY. Well, let me continue down that line then. In that study, it was on the impact of educating about genomic predispositions had on a patient's emotional state. Now, let me make it a little more personal and anecdotal. I had a first cousin deceased several years ago of Lou Gehrig's disease, amyotrophic lateral sclerosis, and he had a wife and three sons and a great life until he got this disease and it took him 3 or 4 years to die from Lou Gehrig's disease. Now, there will come a day, maybe it is already here and I want you to tell us about it, where every individual will go in for an annual routine screening physical examination, and instead of just having several tubes of blood drawn and checking for blood type and different things and maybe an X-ray and an EKG, that they will have an opportunity to have their own genomes studied and maybe a printout that would suggest well, you are 20 years old, Mr. Jones, and your likelihood of developing Lou Gehrig's disease or Huntington's chorea or prostate cancer at some time in your life is a certain statistic or to a woman, same thing with breast cancer and ovarian cancer. But it is no assurance that that will happen to them, it is just a statistical likelihood or chance. How much of this information should be given to patients and what effect would it have on their lives in regard to something like, let us say, Lou Gehrig's disease which has no cure or Huntingdon's chorea, which has no cure? Should they know this? Is this something that people want to know or would it drive them nuts to have that information, say, 40 years before the occurrence of the disease?

Ms. BARKER. So you raise an excellent point. I think we have reached a point in our society where advanced technologies are ahead of the extent to which we have actually incorporated this into our thinking and our planning. Genetic counseling is something that we are investing in but probably not enough, and I think we are going to have to do a lot more and I think genetic counseling will become very much a practice of medicine in the future. I am a bit of futurist so I believe that what is going to happen is that you will get your genome. I think you will know that your probabilities of getting certain diseases are, but as you point out,

the chances are really going to be dependent on the environmental exposure you receive and dozens of other factors and so many people inherit predisposition for breast cancer, don't get breast cancer, and frankly, all the inherited genes that we know about in cancer today are responsible for only probably less than 5 percent of all cancers.

So I do think that people will want to know, and I think as we go forward, and I think the whole idea here is, we will develop prospective strategies for dealing with that both in terms of genetic counseling and ultimately interventions. So we haven't talked much about prevention today but I think as you understand the genomics of these diseases, you will be able to go in and figure out ways to prevent them. Now, it is going to take some time but I think it is going to catalyze a whole new field here of, you know, sort of genomics-based prevention, and that is what I am in favor of. But as you know, there are companies already today that are giving people their genomes, I mean, at least your germline DNA, the changes that you inherited, and they do have genetic counselors. There are two or three of these companies now. And we are kind of watching that to see what impact that is having on patients.

Mr. GINGREY. Well, in the couple of minutes that I have left, let me ask your opinion on this. Do you think ultimately that this will reduce the cost of medicine or that it ultimately will drive it up drastically?

Ms. BARKER. Well, I don't know the answer to the question but my guess is that there will be a blip as in all things and people will take a very high interest in this, and we just discussed, they will then realize that there are certain strategies that you have to undertake to mitigate you risk but that is pretty much what you can do until we can develop interventions to actually either prevent the disease or treat the disease effectively. So I think there may be some blip once everybody—you know, I think it is not going to be that long until everybody can get their genomes sequenced. So I think there will be a period when people have a high level of interest but I am guessing that will become integrated into our society and we will ease off. So I think in the long run it will reduce the cost of health care.

Mr. GINGREY. Well, I think in the long run it will too, and I think I agree with you on that.

The final point that I wanted to ask you about of course is the issue of discrimination, and of course as people get this information at a very young age and go out into the job market, how do we protect them from the possibility of being discriminated against because they have a high risk of developing breast cancer or colon cancer or whatever and as employers look at that or have access to that information? It would be so important to make sure that we protect that information.

Ms. BARKER. And we do. I mean, I didn't mention that all of the data in The Cancer Genome Atlas is protected at a second level. If you want any access to patient data, you have to actually apply for it, and any good, you know, sort of validated investigator can access that data. We are also protecting the patients' data through informed consent, and of course, ultimately the Nation is protecting

that data though GINA and many people have worked tirelessly to pass that bill a few years ago. So I think we have anticipated this. That doesn't mean that there might not be somebody who falls through the cracks here but we have done everything we can but we are going to have to stay ahead of this so that as more and more of this information becomes available, that opportunity doesn't become too much of a temptation for people to actually abuse their privileges in that regard.

Mr. GINGREY. Dr. Barker, thank you. My time is about up, and I thank you so much.

Mr. Chairman, I yield back.

Mr. PALLONE. Thank you. Now, I don't think there is any time left on the floor so I suggest everyone go over there. But Ms. Eshoo wanted to be recognized.

Ms. ESHOO. Thank you, Mr. Chairman. Unfortunately, I can't come back after votes because I have to attend an Intelligence Committee meeting, but I want to thank you, Dr. Barker. I am going to submit my questions to you.

I just want to make an observation, and that is that I think that there needs to be a healthy balance all the way around. You used that word in the beginning of your testimony. But also about advocates and advocacy. I remember a time where the NIH was reluctant for whatever reasons, maybe it was whatever was going on at the time with HIV/AIDS. It was the Congress that pushed it and they pushed the money into it in order to make things happen, especially to help care for the people that were afflicted, which we thought was going to be a pandemic at the time. So I have a lot of regard for the advocacy groups, and there is one that is going to be testifying today on behalf of pancreatic cancer. I think what I would like to know more about at some point is where the balance is between the atlas, the samples, what we are doing with it, The Cancer Genome Atlas, but also the funding of the rest as we do that, because I think that there is a correlation between low investment in research and poor survival rates, and I don't think anyone can really get around that. We have never made a low and gotten a big bang for it.

So I think we need to explore these things and I hope, Mr. Chairman, we will invite Dr. Barker back because there is a great deal of hope riding on you and I think in your words we found a great deal of hope. Thank you, Mr. Chairman.

Ms. BARKER. Thank you.

Mr. PALLONE. Thank you. We stand in recess until these votes.

[Recess.]

Mr. PALLONE. The subcommittee will reconvene. I think we have at least one more member who would like to ask Dr. Barker some questions. I yield to the gentleman from Texas, Dr. Burgess.

Mr. BURGESS. Thank you, Mr. Chairman. I apologize for missing the earlier part of the hearing. As you know, we have several things happening simultaneously. That almost never happens up here on Capitol Hill, but today it did.

You know, one of the things that has come up from time to time—we had the FDA in last week or the week before. There was a significant amount of funding coming to the National Institute of Health out of the stimulus bill last year. As I recall, that was a $10

billion amount that came to the NIH. What portion of that came to the National Cancer Institute?

Ms. BARKER. About $1.28 billion.

Mr. BURGESS. And can you give us an idea of where that funding is now? Has it all been allocated? Is there research now underway as a result of that? Where are we in the process with that?

Ms. BARKER. Most of the funds have been allocated, probably the lion's share of the funds have been allocated, and we will spend about $849 million obligated in 2009 and the remainder will be obligated in 2010. The funds went for special initiatives like The Cancer Genome Atlas, for example, where we invested in acquiring the samples and actually building the database and then Dr. Collins actually also invested money in sequencing these tumors. So some of the money went into the cancer Human Biobank. Much of the money went into, as you might imagine, individual investigator-initiated grants, and some of the money went into supplements to existing grants for investigators who had special projects. We funded quite a number of the innovation grants that actually came in, and overall, the lion's share of the funds as they usually do go to individual investigators but we were able to fund several infrastructure, you know, kinds of programs like The Cancer Genome Atlas and also a lot of translational science, new clinical trials. This is probably the boost for cancer research that I have ever seen, I think the biggest and most catalytic action I have ever seen in cancer research. It has stimulated more thinking and more activities that I have seen in 35 years, and I think it is going to have a huge impact downstream.

Mr. BURGESS. When you fund these research projects, was this money that was all allocated to be spent over 1 year's time or have you funded a research project that may go on over multiple years?

Ms. BARKER. Well, as you know, people are encouraged to spend their money in 2 years and to actually maximize the numbers of people that are hired newly and minimize the number of people who had to be let go in some of these institutions, but some of the grants will be extended over a couple of additional years, especially those that require longer-term objectives be met. So generally speaking, we are encouraging people to spend the money in the 2-year period allotted but there are certain kinds of studies that could proceed another couple of years if they have permission to do so.

Mr. BURGESS. What about the sustainability of research? It is an odd way to get money to get a big chunk of dollars like that. Obviously you have to make a commitment to scientists who are going to stay with you. What do you expect to see in the funding stream and the appropriations process over the next several years? How are we going to make that pitch to the appropriators? As I recall, we did the NIH reauthorization in 2006. It was a base of $30 billion with an increase of 5 percent, so roughly $1.5 billion a year over the 6 years of the authorization. We are coming to the end of that time. Has that been adequate in the way of funding, and now with this additional money that is coming in? Are we going to have other projects that need to be sustained? What do we look for in the future?

Ms. BARKER. Well, I think the additional of $10 billion to NIH was an extraordinarily wise strategic move on the part of Congress and the President. I think it will be extraordinarily difficult, as you would expect, to reduce the numbers of investigators, to reduce the number of programs coming out of the ARRA period. So I think the decisions will be tough ones but I am hopeful that the pace of research and the pace at which things are moving right now in terms of moving us towards a health care system that I think will be much more responsive in terms of reducing costs because we know what the disease is and how to treat it than continuing on the paths that we are on. I think it is one of the best investments we have ever made actually.

Mr. BURGESS. And I don't disagree, but putting a bunch of money in, you are going to come up—you probably have some things that are in clinical trials. How do you see the interaction with the FDA going forward? You are going to have a lot of stuff that has to go through the FDA. And I can actually remember having this discussion with Andy von Eschenbach when he was at NCI before he was at FDA, and he was concerned about the FDA's ability to keep up with the pace of research, and this was back in 2004 and 2005 that he was doing when he was at NCI. So how do you see this playing out? Is the FDA going to be able to keep up with the pressure that you are going to putting on with the demand for approval of new drugs and new therapies and new techniques?

Ms. BARKER. So Andy von Eschenbach, the same year you talked to him talked to me and said we need to put together an interagency oncology task force with FDA. We did that. And that task force has been working now for almost 7 years now, and I would say that—and we have been working on the science that is required to enable FDA to actually, you know, review these drugs and devices accordingly. So many of our things fail because there hasn't been enough science done to actually inform the process. So what we have tried to do over the last 6 or 7 years is to sort of identify the regulatory science that has to be done, to work with them to determine what is a clinical trial going to have to look like, what do the biomarkers have to do to perform in a regulatory sense. We made a lot of progress in that regard, and so I think FDA—and there is a new announcement even a few weeks ago between the Secretary and Dr. Collins of a new relationship between FDA and NIH to do exactly what we have been doing, and that is, to really enhance this regulatory pathway by actually informing the science up front. So I think it is a relationship that has been built and will continue to be built, and I think FDA is anticipating this influx of new agents. For example, we work with them on nanotechnology products and so they are actually coming along and I think are on the same page with where we are.

Mr. BURGESS. I am going to run out of time.

Mr. PALLONE. You are out of time.

Mr. BURGESS. How do you——

Mr. PALLONE. You can't ask any more questions. Your time is over. Let us move on.

Ms. Schakowsky.

Ms. SCHAKOWSKY. Thank you, Mr. Chairman. I thank you, Dr. Barker, and actually all the witnesses who have been patient and waited with us.

This is really just thrilling, the genomics and the nanotechnology and the next generation. I am just wondering if we have all the personnel we need. I have had concerns that once an upcoming scientist leaves NIH for the private sector they don't often come back, and I wondered if this is a concern at NCI. What impact does it have on NCI's ability to advance promising research? Is this a problem where there is a brain drain at all?

Ms. BARKER. So I think it is always going to be a problem because I don't think in our country we are placing enough emphasis in high schools and even earlier on science and mathematics, and that is a problem. We need to do more about that. I just came from China last November, and looking at the number of computational scientists they are training, for example, we are those computational scientists, and fortunately we can partner with these countries. But at NCI what we have attempted to do over the last 7 years is actually really look at the first-time investigator coming in for a grant. We pull out those applications. We call them star R1s. And we preferentially fund those young investigators. So I think we are doing fine in terms of funding young investigators. I think where we are going to fall short is having individuals who know how to work in teams and actually areas like mathematics, as I said before, because the amount of data that we are creating, terabytes every week, has to be analyzed and we have very few individuals that we have trained to analyze this quantity of data. We don't have many Google experts in the biomedical research enterprise. So I think we are doing fine but I think we really need to be very proactive about this and our universities and our high schools and even in our grade schools have to start thinking about putting science and mathematics back on the agenda, the top of the agenda, so they can bring the best and brightest into this field. I can't imagine if I were entering college today, I mean, I cannot imagine what an exciting future they are looking at.

Ms. SCHAKOWSKY. Exactly.

Ms. BARKER. It is absolutely stunning. You know, the choices are amazing but these kids all grew up with their computer games and game theory and those are the kids that will be able to analyze the data.

Ms. SCHAKOWSKY. Right, and they are used to changing technologies and being early adopters and being flexible. I think that we need to do a better sales job about just what is possible and soon in the fields of science. I was told by the Northwestern University in my hometown that were it not for Chinese students that postgraduate programs in science and math would probably have to shut down, and now the foreign students that we certainly want to come in go home. They are taking the skills that they learn here and going back home.

Ms. BARKER. In large numbers.

Ms. SCHAKOWSKY. Yes, and so I appreciate your emphasizing the STEM programs. I think we all have to get behind that. But I think if we could just paint a picture of the kinds of achievements that are possible for them as individuals, the kinds of teams that

they could be working on that are going to deliver cures, it is just incredible. So I thank you for all your work, and Mr. Chairman, I yield back.

Ms. BARKER. My pleasure.

Mr. PALLONE. I think that completes our questions. Thank you for bearing with us and for your input. I know members talk about doing further hearings on this subject. We will certainly look at it. I don't know what exactly we can do but I do appreciate you being here today. You may get some additional written questions within the next 10 days or so from the clerk, and if you do, I would ask that you respond to them. Thanks a lot.

Ms. BARKER. I really appreciate the opportunity. Thanks to all.

Mr. BURGESS. Mr. Chairman, may I just make an inquiry? Do we get at the committee level—it seems like in years past the NCI used to produce an annual report? Is that made available to the committee?

Ms. BARKER. Yes.

Mr. BURGESS. Mr. Chairman, could I just ask that we all get a copy of the most recent report? I think it would be——

Mr. PALLONE. Is it something that is very voluminous?

Ms. BARKER. No.

Mr. PALLONE. You can get hard copies?

Ms. BARKER. It is quite short.

Mr. PALLONE. All right. Let us get some hard copies. Thank you.

Ms. BARKER. All right. We will follow up with that. Thank you.

Mr. PALLONE. I ask the second panel to come forward, if you would. Thank you for bearing with us. Let me introduce each of the members of this panel. Beginning on my left, she was introduced before, is Ms. Kristin Fitzgerald from Naperville, Illinois. Thanks for being with us today. And then we have Megan Gordon Don, who is the chair of the Deadly Cancer Coalition and director of government affairs for the Pancreatic Cancer Action Network. And then from New Jersey is Dr. Robert DiPaola, who is a member of the American Association of Cancer Research and director of the Cancer Institute of New Jersey. And last is Jeff Allen, who is the executive director of the Friends of Cancer Research. We ask you each to give us a 5-minute statement, if you will. That becomes part of the hearing record and after that our own questions for 5 minutes each. As I mentioned, we may give you some written questions in the next 10 days or so.

So let us start with Ms. Fitzgerald. Thank you so much.

STATEMENTS OF KRISTIN FITZGERALD, NAPERVILLE, ILLINOIS; MEGAN GORDON DON, M.H.S., CHAIR, DEADLY CANCER COALITION, DIRECTOR OF GOVERNMENT AFFAIRS, PANCREATIC CANCER ACTION NETWORK; ROBERT S. DIPAOLA, M.D., MEMBER, AMERICAN ASSOCIATION OF CANCER RESEARCH, AND DIRECTOR, CANCER INSTITUTE OF NEW JERSEY; AND JEFF ALLEN, PH.D., EXECUTIVE DIRECTOR, FRIENDS OF CANCER RESEARCH

STATEMENT OF KRISTIN FITZGERALD

Ms. FITZGERALD. Mr. Chairman, members of the subcommittee, I want to thank you for the opportunity to testify at today's hearing.

My name is Kristin Fitzgerald. As a former health staffer, I have participated in many Congressional hearings. This is, however, my first time on this side of the dais, and I greatly appreciate the opportunity to speak to the challenges facing cancer research. I am here today not only on my own behalf, but that of my husband, Ray Fitzgerald, who as you have heard was a staffer for Congressman Shimkus.

Ray died last January of gastric, or stomach, cancer. Until his diagnosis in May of 2008, Ray was a healthy 36-year-old man. He had no risk factors for cancer. He had never smoked, drank infrequently, and lived a healthy lifestyle. With a large Irish family before him, there were only four unrelated incidences of cancer before him. Nothing would ever have put him at high risk of a cancer diagnosis.

Ray's cancer symptom was burping, which appeared for a period of 2 months before his cancer was diagnosed. When Ray was diagnosed, his cancer was an advanced stage IV. His gastric tumor had spread throughout the lining of his stomach and progressed to his esophagus and throughout his liver. We were told that there was no hope of a cure but that chemotherapy could reduce the cancer for a time. That time was 8 months.

This is not an abnormal scenario for gastric cancer. It is the second deadliest cancer worldwide. It very often presents in Stage IV, and is always incurable at that point. Ray however, was 40 years younger than the average gastric cancer patient, and thus the grim prognosis impacted not just Ray, but myself and our three young daughters, Nora, Maggie and Lucy. Nora and Maggie are here.

It is my belief that Ray's diagnosis and prognosis is our worst cancer nightmare: diagnosis of a deadly cancer with very few warning signs at an advanced stage where a cure is impossible. It is a death sentence. And if we think it can't or won't happen to us, we are wrong. Ray was one of us, or at least in your case, your staff. And as I have learned, it could even be happening to one of us right now, and we would never know it.

After Ray died, I spent some time talking with Ray's doctors to see how this kind of scenario can be prevented so that more young dads and moms aren't violently stolen from their families by cancer. As a former health staffer, I assumed that gastric cancer research was ongoing and would utilize Ray's tumor specimen and facts about his age and health status to find a cure for this deadly cancer. However, far too little is being done to research gastric can-

cer and other gastrointestinal, or GI, cancers that have a similar deadly prognosis. CBS News analyzed the disparity in research dollars in May of 2009. For each cancer death, the most federal research dollars are spent on cancer of the cervix at $18,000 per fatality and breast at $14,000 per fatality, contrasted by the least funded, which is gastric cancer at $1,100 per cancer fatality.

GI cancers are some of the deadliest cancers in the United States with deaths attributed to the digestive system second only to those in the respiratory system. Four out of the five lowest 5-year cancer survival rates for metastatic cancer are GI, pancreas, liver, esophagus and stomach. And GI cancers are rising, particularly in young people. A recent NCI article documented the rise in gastroesophageal cancers of the stomach and esophagus. This article compared the incidence rates in two 4-year periods, 1975 through 1979 and 2000 through 2004. Overall, there was a 44 percent increase in these cancers. Within gastroesophageal cancers there was an explosion of a particular type, adenocarcinoma, which is what Ray had. The increase in adenocarcinoma was 465 percent, with a 190 percent increase in young white males. And the situation for young people with GI cancers is particularly grim. Because GI cancers are considered to be diseases of middle or advanced age, the diagnosis in people under 40 is often delayed. As a result, the disease is usually in an advanced stage with a poor prognosis by the time the diagnosis is established. And their very age works against them. The strength and relative health of their bodies is passed on to their cancers, making them even more aggressive than in older patients. As a result, GI cancers in young people tend to be fatal.

Yet, unlike other deadly cancers, gastric cancer and many other GI cancers do not have a national clinical registry and tissue bank to utilize tumor tissue and clinical records for research purposes. In my view, this is intolerable. Congress and NCI can and should do more to ensure that researchers can have access to the tools they need to prevent and diagnose these cancers before it is too late. Though these cancers are growing, they are poor candidates for wide-scale screening programs due to the smaller population of people impacted and the invasive nature of screening available.

More research is essential in order to understand the unique characteristics of the disease in younger people and develop a screening test based on molecular markers to allow for earlier detection. In order to accomplish this research, NCI must develop a coordinated national GI cancer tissue biorepository and accompanying research project to focus research in this area and make tumor tissue available for research purposes.

Last year the Labor, HHS, and Education Appropriations Report included language asking NCI to do just that. To date, this has not yet been accomplished. Congress must act to ensure that these cancers can be detected and cured so that more lives are not lost.

Ray was a wonderful man and his spirit will live on always. However, it is my belief that Congress should fund a research project, tissue bank and registry so that the physical legacy of a patient like Ray can live on forever, giving eternal gifts to researchers and scientists throughout the world.

Members of the subcommittee, thank you for your time and consideration. I am happy to answer any questions.

[The prepared statement of Ms. Fitzgerald follows:]

Kristin W. Fitzgerald

Testimony before the Health Subcommittee of the House Energy and Commerce Committee

"NCI Cancer Research: Today's Progress; Tomorrow's Challenges"

March 23, 2010

Members of the Subcommittee, I want to thank you for the opportunity to testify at today's hearing, "NCI Cancer Research: Today's Progress; Tomorrow's Challenges."

My name is Kristin Fitzgerald. As a former health staffer for Representatives John Boehner, Judy Biggert, and Harris Fawell, I have participated in many Congressional Hearings. This is however, my first time on this side of the dais, and I greatly appreciate the opportunity to speak to the challenges facing cancer research.

I am here today not only on my own behalf, but that of my husband, Ray Fitzgerald.

Ray was also a Congressional staffer. In fact, he worked for six years as legislative director for the Ranking Member of this Commerce Health Subcommittee, Congressman John Shimkus.

Ray died last January of gastric or stomach cancer.

Until his diagnosis in May of 2008, Ray was a healthy 36 year old man. He had no risk factors for cancer. He had never smoked, drank infrequently and lived a healthy lifestyle. With 12 aunts and uncles and 72 first cousins in his large Irish family, there were only four unrelated incidences of cancer before him. Nothing would ever have put him at high risk of a cancer diagnosis.

Ray's cancer symptom was burping which appeared for a period of two months before his cancer was diagnosed.

When Ray was diagnosed, his cancer was an advanced stage IV. His gastric tumor had spread throughout the lining of his stomach and progressed to his esophagus and liver.

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That time was eight months.

This is not an abnormal scenario for gastric cancer, it is the second deadliest cancer worldwide. It very often presents in Stage IV, and is always incurable at that point.

Ray however, was forty years younger than the average gastric cancer patient, and thus the grim prognosis impacted not just Ray, but myself and our three young daughters, Nora (5), Maggie (3) and Lucy (1).

Members of the Subcommittee, it is my belief that Ray's diagnosis and prognosis is our worst cancer nightmare: diagnosis of a *deadly cancer* at an *advanced* stage where a *cure is impossible*. It is a death sentence.

And if we think it can't or won't happen to us, we are wrong. Ray was you -- or at least, your staff. And as I have learned, it could even be happening to one of us right now, and we would never know it.

After Ray died I spent time talking with Ray's doctors to see how this kind of scenario can be prevented so that more young dads and moms aren't violently stolen from their families by cancer.

As a former health staffer, I assumed that gastric cancer research was ongoing and would utilize Ray's tumor specimen and facts about his age and health status to find a cure for this deadly cancer.

However, far too little is being done to research gastric cancer and other gastrointestinal cancers that have a similar deadly prognosis. CBS news analyzed the disparity in research dollars in May of 2009. For every cancer death, the most federal research dollars were spent on cancer of the cervix ($18,870) and breast ($14,095) and on Hodgkin lymphoma ($12,791). The least funded was gastric cancer ($1,168), with esophageal cancer a close third at ($1,542).[i]

Gastrointestinal (GI) cancers are some of the deadliest cancers in the U.S. with deaths attributed to the digestive system second only to those in the respiratory system. Four out of the five lowest five year cancer survival rates for metastatic cancer are GI: Pancreas 1.7%; Liver 2.8%; Esophagus 2.9% and Stomach 3.4%.[ii]

And, gastrointestinal cancers are rising, particularly in young people. Though it is very difficult to track current trends in cancers in a timely way because of the slow reporting of Surveillance Epidemiology and End Results (SEER) data, a recent NCI article documented the rise in gastroesophageal cancers of the stomach and esophagus. The article compared the incidence rates in two four year periods, 1975-1979 and 2000-2004. Overall there was a 44 percent increase in these cancers. Within gastroesophageal cancers there was an explosion of a particular type, adenocarcinoma. The increase in adenocarcinoma was 465 percent, with an 190 percent increase in young white males.[iii] Attachment 1

And the situation for young people with GI cancers is particularly grim. Because GI cancers are considered to be diseases of middle or advanced age, the diagnosis of GI cancers in people under 40 is often delayed. As a result, the disease is usually in an advanced stage with a poor prognosis by the time the diagnosis is established. And their very age works against them as the strength and relative health of their bodies is passed on to their cancers making them even more aggressive than in older patients. As a result of the delay in diagnosis and the more aggressive phenotype of cancers in young people, GI cancers in young people tend to be fatal.

Yet, unlike other deadly cancers, gastric cancer and many other gastrointestinal cancers do not have a national clinical registry and tissue bank, to utilize tumor tissue and clinical records for research purposes.

In my view, this is intolerable. Congress and the National Cancer Institute can and should do more to ensure that researchers can have access to the tools they need to prevent and diagnose these cancers before it is too late.

Though these cancers are growing, they are poor candidates for wide-scale screening programs due to the smaller population of people impacted and the invasive nature of screening available.

More research is *essential* in order to understand the unique characteristics of the disease in younger people and develop a *screening test based on molecular markers to allow for earlier detection*. In order to accomplish this research, the National Cancer Institute must also develop a coordinated national GI cancer tissue biorepository, and accompanying research project to focus research in this area and make tumor tissue available for research purposes.

Last year the Labor, HHS, and Education Appropriations Report included language asking the National Cancer Institute to develop a research project and accompanying tissue repository to study GI cancers in young people. To date, this has not been accomplished.

Congress must act to ensure that these cancers can be detected and cured so that more lives are not lost.

Ray was a wonderful man and the legacy of his *spirit* will live on always. However, it is my belief that Congress should fund a research project, tissue bank and registry so that the *physical legacy* of patients like Ray can *live on forever, giving eternal gifts to researchers and scientists throughout the world.*

Members of the Subcommittee thank you for your time and consideration. I am happy to answer any questions.

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[i] Data compiled and reported by CBS Evening News, May 27, 2009.

[ii] American Cancer Society. Cancer Facts & Figures 2008. Atlanta: American Cancer Society; 2008.

[iii] "Incidence of Adenocarcinoma of the Esophagus Among White Americans by Sex, Stage, and Age," Linda Morris Brown , Susan S. Devesa , Wong-Ho Chow, Journal of the National Cancer Institute 2008;100: 1184 – 1187.

Incidence of Adenocarcinoma of the Esophagus Among White Americans by Sex, Stage, and Age

Linda Morris Brown, Susan S. Devesa, Wong-Ho Chow

Rapid increases in the incidence of adenocarcinoma of the esophagus have been reported among white men. We further explored the temporal patterns of this disease among white individuals by sex, stage, and age by use of data from the Surveillance, Epidemiology, and End Results program. We identified 22 759 patients from January 1, 1975, through December 31, 2004, with esophageal cancer, of whom 9526 were diagnosed with adenocarcinoma of the esophagus. Among white men, increases in the incidence of esophageal cancer were largely attributed to a 463% increase in the incidence of adenocarcinoma over this time period, from 1.01 per 100 000 person-years (95% confidence interval [CI] = 0.90 to 1.13) in 1975–1979 to 5.69 per 100 000 person-years (95% CI = 5.47 to 5.91) in 2000–2004. A similar rapid increase was also apparent among white women, among whom the adenocarcinoma rate increased 335%, from 0.17 (95% CI = 0.13 to 0.21) to 0.74 per 100 000 person-years (95% CI = 0.67 to 0.81), over the same time period. Adenocarcinoma rates rose among white men and women in all stage and age groups, indicating that these increases are real and not an artifact of surveillance.

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Total esophageal cancer incidence and mortality have been increasing among white men, stable among white women, and decreasing in black men and women (1). It is projected that there will be 16 470 new patients diagnosed with esophageal cancer and 14 280 deaths from it in 2008 (2). Rapid increases in the incidence of adenocarcinoma of the esophagus have been reported in the United States, with rates highest among white males (3–6). These patterns are in contrast to those for squamous cell carcinoma of the esophagus, for which rates have been considerably higher among blacks than whites and have been declining in recent decades. To better understand the temporal patterns and to assess the potential influence of heightened surveillance for adenocarcinoma we performed a detailed examination of the temporal trends among white individuals by sex, stage, and age. Esophageal adenocarcinoma cases among blacks (211) and other races (185) were too few for in-depth analyses.

Data from nine population-based registries in the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program (1) were used to calculate incidence rates of primary invasive esophageal cancer (*International Classification of Diseases for Oncology*, 3rd edition, topography codes 150–159) for 22 759 white patients diagnosed during the period from January 1, 1975, through December 31, 2004, in six 5-year time periods (ie, 1975–1979 through 2000–2004) (7). The nine registries, accounting for approximately 10% of the US population, are located in the metropolitan areas of Atlanta, Detroit, San Francisco–Oakland, and Seattle–Puget Sound and the states of Connecticut, Hawaii, Iowa, New Mexico, and Utah. All SEER Registries annually meet the Gold Standard Registry Certification from the North American Association of Central Cancer Registries, Inc, for completeness (at least 95%), accuracy (<3% of cases identified through death certificates only), and timeliness of data. Age-adjusted rates (using the 2000 US standard) and 95% confidence intervals (CIs) were calculated by sex and histological type (adenocarcinoma, morphology codes 8140–8575; squamous cell carcinoma, codes 8050–8084) by use of SEER*Stat software (8). Age-adjusted rates by stage (local, regional, distant, and unknown, as indicated by SEER historic stage A) and age-specific rates (age groups 25–44, 45–54, 55–64, 65–74, and ≥75 years) were calculated for adenocarcinoma by sex. All rates were expressed per 100 000 person-years, and only data points with at least 10 observations were presented. Temporal trends were plotted so that a slope of 10 degrees represented a change of 1% per year (ie, 40 years on the horizontal axis is the same length as one logarithmic cycle on the vertical axis) (9).

During the time period 1975–2004, 22 759 white patients were diagnosed with esophageal cancer (16 493 men and 6266 women), of whom 9526 were diagnosed with adenocarcinoma (8128 men and 1398 women). Among white men, total age-adjusted esophageal cancer rates increased steadily from 5.76 per 100 000 person-years (95% CI = 5.49 to 6.03) during 1975–1979 to 8.34 per 100 000 person-years (95% CI = 8.08 to 8.60) during 2000–2004, largely because of a 463% increase in adenocarcinoma rates from 1.01 (95% CI = 0.90 to 1.13) to 5.69 (95% CI = 5.47 to 5.91) (Table 1 and Figure 1). The incidence of squamous cell carcinoma decreased 50% across the study period, from 3.81 per 100 000 person-years (95% CI = 3.59 to 4.03) in 1975–1979 to 1.90 per 100 000 person-years (95% CI = 1.77 to 2.03) in 2000–2004. With the decreases in squamous cell carcinoma and the increases in adenocarcinoma, the rate for adenocarcinoma among white men surpassed that for squamous cell carcinoma around 1990. Among white women, total esophageal cancer rates remained constant at around 2.0 per 100 000 person-years during the time period 1975–2004, attributable to a 29% decrease in squamous cell carcinoma from 1.38 per 100 000 person-years (95% CI = 1.28 to 1.50) during 1975–1979 to 0.98 per 100 000 person-years in 2000–2004 (95% CI = 0.90 to 1.06) and a 335% increase in adenocarcinoma from 0.17 per 100 000 person-years (95% CI = 0.13 to 0.21) in 1975–1979 to 0.74 per 100 000 person-years in 2000–2004 (95% CI = 0.67 to 0.81). The gap between squamous cell

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CONTEXT AND CAVEATS

Prior knowledge

Rapid increases in the incidence of adenocarcinoma of the esophagus have been reported among white men.

Study design

Registry study in which data from the Surveillance, Epidemiology, and End Results program from January 1, 1975, through December 31, 2004, was used to explore the temporal patterns of this disease among white individuals by sex, stage, and age.

Contribution

Adenocarcinoma incidence rates rose from 1975 through 2004 among white men and women in all stage and age groups. The incidence of adenocarcinoma among white men increased 463%, from 1.01 per 100 000 person-years in 1975–1979 to 5.69 per 100 000 person-years in 2000–2004. A similar rapid increase was also apparent among white women, with an increased incidence of 335% from 0.17 per 100 000 person-years to 0.74 per 100 000 person-years.

Implications

Because the increases in incidence are independent of stage and age group, they appear to be real and not an artifact of surveillance.

Limitations

Cases of adenocarcinoma may have been missed or misclassified. Data for the most recent years may have been underreported. Pathological diagnoses were not reviewed centrally.

From the Editors

Table 1. Esophageal cancer incidence among whites in nine SEER registries, 1975–1979 to 2000–2004*

Characteristic	1975–1979 No. of patients	1975–1979 Rate† (95% CI)	2000–2004 No. of patients	2000–2004 Rate† (95% CI)	% change in rate†
White males					
Total esophagus	1928	5.76 (5.49 to 6.03)	3943	8.34 (8.08 to 8.60)	44.8
Squamous cell	1303	3.81 (3.59 to 4.03)	889	1.90 (1.77 to 2.03)	−50.1
Adenocarcinoma	344	1.01 (0.90 to 1.13)	2706	5.69 (5.47 to 5.91)	463.4
Other and NOS	281	0.94 (0.83 to 1.06)	348	0.76 (0.68 to 0.84)	−19.1
Adenocarcinoma by stage					
Localized	65	0.20 (0.15 to 0.25)	692	1.48 (1.37 to 1.60)	640.0
Regional	101	0.28 (0.22 to 0.34)	892	1.86 (1.74 to 1.99)	564.3
Distant	111	0.31 (0.25 to 0.38)	884	1.81 (1.69 to 1.94)	483.9
Unstaged	67	0.22 (0.17 to 0.29)	238	0.53 (0.47 to 0.60)	140.9
Adenocarcinoma by age, y					
25–44	16	0.17 (0.10 to 0.28)	78	0.50 (0.39 to 0.62)	194.1
45–54	67	1.40 (1.08 to 1.78)	386	5.05 (4.55 to 5.57)	260.7
55–64	115	2.85 (2.35 to 3.42)	684	14.11 (13.07 to 15.21)	395.1
65–74	88	3.83 (3.07 to 4.73)	774	26.27 (24.45 to 28.19)	585.9
≥75	58	4.43 (3.36 to 5.75)	784	31.33 (29.17 to 33.60)	607.2
White females					
Total esophagus	855	1.93 (1.80 to 2.07)	1227	2.00 (1.89 to 2.12)	3.6
Squamous cell	622	1.38 (1.28 to 1.50)	589	0.98 (0.90 to 1.06)	−29.0
Adenocarcinoma	73	0.17 (0.13 to 0.21)	454	0.74 (0.67 to 0.81)	335.3
Other and NOS	160	0.38 (0.32 to 0.44)	184	0.29 (0.25 to 0.33)	−23.7
Adenocarcinoma by stage					
Localized	18	0.04 (0.02 to 0.07)	135	0.21 (0.18 to 0.25)	425.0
Regional	13	0.03 (0.02 to 0.05)	131	0.22 (0.18 to 0.26)	633.3
Distant	25	0.06 (0.04 to 0.09)	129	0.22 (0.18 to 0.26)	266.7
Unstaged	17	0.04 (0.02 to 0.06)	59	0.09 (0.07 to 0.11)	125.0
Adenocarcinoma by age, y					
25–44	2	—	15	0.10 (0.06 to 0.16)	—
45–54	7	—	36	0.47 (0.33 to 0.65)	—
55–64	12	0.28 (0.14 to 0.48)	79	1.57 (1.24 to 1.95)	460.7
65–74	26	0.83 (0.54 to 1.22)	100	2.89 (2.35 to 3.51)	248.2
≥75	26	1.07 (0.70 to 1.57)	223	5.20 (4.53 to 5.94)	386.0

* SEER = Surveillance, Epidemiology, and End Results; CI = confidence interval (generated by the Tiwari method) are 95% for rates; NOS = not otherwise specified; — = statistic could not be calculated because the rate was based on fewer than 10 cases.

† Rates are per 100 000 person-years, age-adjusted to the 2000 US standard population.

carcinoma and adenocarcinoma continued to narrow because rates in 2004 were 1.13 per 100 000 person-years (95% CI = 0.95 to 1.34) and 0.84 per 100 000 person-years (95% CI = 0.68 to 1.02), respectively.

Stage-specific adenocarcinoma rates among men increased steadily over the entire time period, and the slopes were remarkably similar, regardless of whether the men were diagnosed with localized (from 0.20 per 100 000 person-years in 1975–1979 to 1.48 per 100 000 person-years in 2000–2004), regional (from 0.28 to 1.86 per 100 000 person-years), or distant-stage (from 0.31 to 1.81 per 100 000 person-years) disease. There was, however, some suggestion that the rate of increase may be slowing, especially for localized disease. A similar pattern was observed for women, although the rates were much lower for each stage (ranging from 0.06 or less per 100 000 person-years in 1975–1979 to 0.21–0.22 per 100 000 person-years in 2000–2004).

Over the three decades studied, the increases in adenocarcinoma occurred across all age groups. Among men, the greatest rates of increase (about 600%) and the highest rates were observed for the two oldest age groups, those aged 65 years or older. Rates also increased across all age groups among women, and the slopes appear remarkably parallel.

This study has several limitations. Cases of adenocarcinoma of the esophagus may have been missed or misclassified, but this is unlikely because quality control efforts regarding case finding, abstracting, and coding have been an integral part of the SEER program since its inception (1). Data for the most recent years may be underreported, and SEER has estimated delay-adjusted rates in many instances. Thus, the upward trends in adenocarcinoma may be even more pronounced than what we have reported. The pathological diagnoses were not reviewed centrally, but the microscopic distinction between adenocarcinoma and squamous cell carcinoma has been recognized for decades. Furthermore, declines in the histological type category

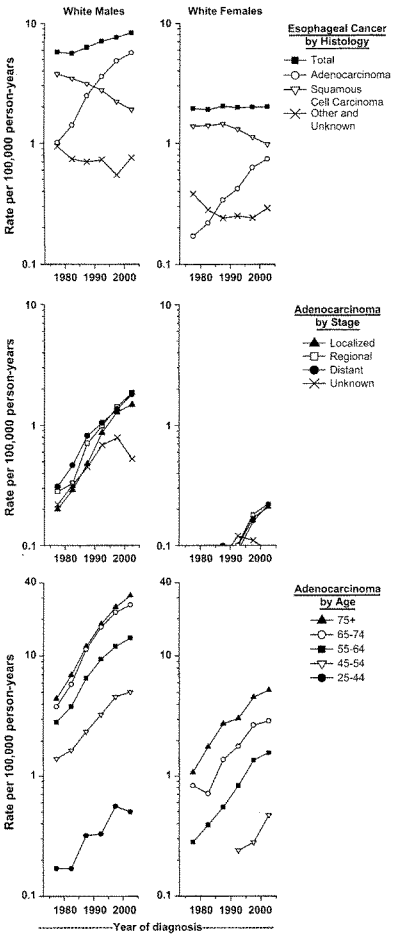

Figure 1. Trends in age-adjusted (2000 US standard) esophageal cancer rates across six 5-year periods, from 1975–1979 through 2000–2004, among white individuals by sex. Data are from nine Surveillance, Epidemiology, and End Results Registries. For adenocarcinoma rates by age group, ages are shown in years. For 95% confidence intervals for the earliest and latest points plotted, see Table 1.

other and not otherwise specified that might indicate improving specificity of the diagnoses were modest and could not explain the observed increases in adenocarcinoma.

Adenocarcinoma rates are rising rapidly and at a similar pace among both white men and women. This increase was not clear in earlier reports (3–6) because of the rarity of adenocarcinoma among women. Improving diagnosis or increasing exposures may be affecting both sexes. All rates by stage rose at similar paces; however, the rate of increase may be slowing, especially for localized disease, indicating that the overall increase in adenocarcinoma incidence is unlikely to reflect heightened surveillance and earlier diagnosis. The increases appeared across all age groups, and the slopes were remarkably similar to each other. The parallel upward trends by age groups make it difficult to determine whether the patterns are reflecting only period effects, as observed for prostate cancer and prostate-specific antigen screening (10), or whether birth cohort effects may play a role, as observed convincingly for lung cancer and cigarette smoking (11,12). An earlier analysis that developed multistage carcinogenesis models by use of 1973–2000 SEER data indicated that the adenocarcinoma temporal trends were driven more by period than birth cohort effects (13).

Our findings are consistent with a Dutch study (14) that reported a substantial increase in Barrett esophagus, the precursor lesion for adenocarcinoma, that was not explained by changes in endoscopic practice or histopathological criteria. Although the exact mechanism is unclear, Barrett esophagus may be related to the higher intraabdominal pressure and increased prevalence of gastroesophageal reflux disease in obese individuals. We previously presented (6) data showing rapid increases in reflux disease among US veterans, with rates of increase that were similar to those for adenocarcinoma. Also, increases in obesity by age and sex since the mid-1970s appear to parallel increases in adenocarcinoma (15), and recent data (16) indicate that increases in obesity, particularly abdominal obesity, may account for part of the upward trend in the incidence of adenocarcinoma (13,17). Another reason for the increasing frequency of Barrett esophagus–associated adenocarcinoma may be the decreasing frequency of infection with *Helicobacter pylori*, which is associated with gastric atrophy and reduction in gastric acid secretion (18,19). Our data indicate that the increase in adenocarcinoma is real

and a growing health problem for both white men and women.

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Mr. PALLONE. Thank you so much.
Ms. Don.

STATEMENT OF MEGAN GORDON DON

Ms. DON. Mr. Chairman and members of the subcommittee, my name is Megan Gordon Don and I am here on behalf of the Pancreatic Cancer Action Network as well as the Deadly Cancer Coalition. I appreciate the opportunity to testify today regarding deadly cancers and the state of cancer research.

I am going to give you some background on the research problems associated with deadly cancers and why the Deadly Cancer Coalition was formed as well as provide you with four key recommendations for the committee's consideration. While a number of cancers have achieved 5-year survival rates of over 80 percent since passage of the National Cancer Act in 1971, and the average 5-year survival rate for all cancers has increased during that time from 50 percent to 66 percent, significant challenges still remain for other types of cancer. In fact, there are eight major cancers that have yet to reach the 1971 benchmark. Nearly half of the over 562,000 cancer deaths in 2009 were caused by these same eight forms of cancer, which are ovarian, brain, myeloma, stomach, esophageal, lung, liver and pancreatic. I have provided for the record a fact sheet on these cancers, which we refer to as the deadly cancers.

As grim as the statistics are now for deadly cancers, the future looks even worse. According to an article in the June 2009 edition of the Journal of Clinical Oncology, cancer incidence is not only projected to dramatically increase in the next 20 years, but some of the deadliest cancers will be among those of the greatest relative increase in incidence.

In contrast to many of the other cancers with significantly better survival rates, research into the deadly cancers has been relatively underfunded, and as a result, these cancers have no early detection or treatment tools or the available treatments are still considered controversial. While there has been some work through the TCGA, as Dr. Barker highlighted, for three of the deadly cancers, and while NCI has expressed interest in expanding TCGA to more deadly cancers, biomarkers have yet to be identified or validated for the majority. Also, survival for these cancers is measured in weeks and months, not years.

Research into deadly cancers has also faced many hurdles including low priority status, little accountability, low average funding, little understanding of the research complexities by grant reviewers, deadly research grants are rarely reviewed by experts in the field, and a shortage of available tissue.

Our coalition started with the premise that all cancer patients deserve at least a 50–50 chance of survival. And, at a minimum, survival from all types of cancers should be above the starting line that was established nearly 40 years ago. The fact that there are a set of cancers that have not reached that starting line, in most cases are not even close, indicates that the time has come to establish a targeted effort to focus on the greatest challenges with the greatest need: deadly cancers. These challenges are not insurmountable but it will take leadership, vision and a change in the

current research paradigm at NCI. Specifically, we are calling for an increase in funding, the creation of a targeted deadly cancer program to provide structure and accountability, a dedicated grant program, and expert review of grants.

I want to note that our recommendations are not about telling NCI how to do the science. We are calling for an increase in funding because the data clearly shows that deadly cancers are currently not research priorities at NCI.

I would like to call the subcommittee's attention to two charts that I have provided for the record. The first shows NCI funding for the top five cancer killers. Lung and pancreatic are two of the most deadly, and they also have the lowest funding levels. Looking at the survival rates, you also see that survival is the lowest. This chart demonstrates in very dramatic fashion that there is a clear correlation between low investment in research and poor survival rates, and vice versa. The second chart shows that less than 18 percent of NCI's funding has gone to the deadly cancers, and yet over half of the cancer deaths are caused by the eight deadly cancers. Across all types of cancer combined, the NCI spent just over $7,000 per cancer death in 2008. For the deadly cancers, NCI devoted only about $2,500. Taken together, these charts clearly demonstrate that the status quo is not working for the deadly cancers and some sort of targeted funding is needed.

Mr. Chairman, creating structure and accountability is absolutely essential to making progress. Therefore, a second recommendation is to create a targeted cancers program that includes strong accountability measures such as requiring the NCI director to develop a strategic plan to increase survival rates for the deadly cancers. Furthermore, we call for annual reports to Congress showing progress against the strategic plan to further ensure accountability.

Our third recommendation is to establish a new targeted grants program to create a protected pool of research funds for the deadliest cancers. This additional grant opportunity will help to compensate for the limited existing data on deadly cancers which put these grant applications at a competitive disadvantage with the better researched cancers and allow these grants to be evaluated in a way that would foster more funding opportunities for both experienced and young investigators in order to attract more scientists to this field of study. Grant review committees would include scientific experts in the specific disease areas of interest, another critical point for deadly cancers in our fourth and last recommendation. We have presented the idea for a targeted cancers program to the NCI and have also been working with the House and Senate sponsors of the ALERT Act.

Chairman Pallone, on behalf of the Deadly Cancer Coalition, I would like to commend you and Representative Capps for your work on the ALERT Act. It captures many of the recommendations outlined above. Additionally for the pancreatic cancer community, passage of H.R. 745, the Pancreatic Cancer Research and Education Act, introduced by Representatives Anna Eshoo and Ginny Brown-Waite, is another important step to tackling the changes I have discussed.

Mr. Chairman, in conclusion, I want to thank you and members of the subcommittee again for allowing me the time to testify. The Deadly Cancer Coalition believes that the time has come to create a new research paradigm at NCI that will lead to the institute tackling the hardest and most complex problems. It is by solving the hardest problems that we will likely see the greatest rewards for the entire field of cancer research. I am happy to answer any questions.

[The prepared statement of Ms. Don follows:]

Mr. Chairman and members of the Subcommittee:

My name is Megan Gordon Don; I am here on behalf of the Pancreatic Cancer Action Network as well as the Deadly Cancer Coalition, a coalition of organizations that represent high mortality cancers, defined as those with five-year survival rates below 50 percent. I appreciate the opportunity to testify today regarding deadly cancers and the state of cancer research.

I'm going to give you some background on the research problems associated with deadly cancers and why the Deadly Cancer Coalition was formed as well as provide you with four key recommendations for the Committee's consideration.

I would like to first provide some background on what are best described as the deadliest cancers. While a number of cancers have achieved five-year survival rates of over 80 percent since passage of the National Cancer Act in 1971, and the average five-year survival rate for all cancers has increased during that time from 50 percent to 66 percent, significant challenges still remain for other types of cancers, particularly the most deadly forms of cancer. In fact, nearly half of the 562,340 cancer deaths in 2009 were caused by eight forms of cancer with five-year relative survival rates of less than 50 percent: ovary (45.5%), brain (35.0%), myeloma (34.9%), stomach (24.7%), esophagus (15.8%), lung (15.2%), liver (11.7%), and pancreas (5.1%). I have provided for the record a fact sheet on the deadliest cancers.

It is no coincidence that cancers with significantly better five year survival rates, such as breast, prostate, colon, testicular, and chronic myelogenous leukemia, also have effective treatment options – in some cases, several – and/or early detection tools thanks to research programs championed and supported by Congress. By contrast, research into the cancers with the lowest five-year survival rates has been relatively under-funded, and as a result, these cancers have no early detection or treatment tools. Available treatment protocols for many of the deadly cancers are still considered controversial. In further contrast, while there has been some work through The Cancer Genome Atlas (TCGA) for lung, brain, and ovarian cancer, which are three deadly cancers, biomarkers have yet to be identified or validated for the majority of deadly cancers. Also, survival for these cancers is measured in weeks and months, rather than years.

As grim as the statistics are now for the deadly cancers, the future looks even bleaker. According to an article in the June 2009 edition of the Journal of Clinical Oncology, cancer incidence is not only projected to dramatically increase in the next 20 years, but "certain cancer sites with particularly high mortality rates, such as liver, stomach, pancreas, and lung, will be among those with the greatest relative increase in incidence." In fact, the article projected that lung cancer incidence would increase by 52 percent, pancreatic cancer would increase by 55 percent, liver cancer would increase by 59 percent and stomach cancer would increase by 67 percent.

Our coalition started with the premise that all cancer patients deserve *at least* a 50-50 chance of survival. And, *at a minimum*, survival from all types of cancers should be above the starting line that was established 30 years ago when the overall cancer survival rate was 50 percent. The fact remains that there are a number of cancers, which make up nearly half of all cancer deaths

annually, that have not yet reached that starting line and in most cases are not even close. This shortcoming indicates that the time has come to establish a targeted effort to focus on the greatest challenges with the greatest need: the high mortality cancers.

Research into high mortality cancers has faced many hurdles including: low priority status, little accountability, below average funding, little understanding of the research complexities by grant reviewers (high mortality research grants are rarely reviewed by experts in that field), and a shortage of available tissue for research caused by the complexities of the diseases. To help you better understand what these hurdles have actually meant in the fight to increase survival for patients diagnosed with one of the deadliest cancers, I would like to use pancreatic cancer as an example. With a five year survival rate of just 5 percent, it is the deadliest of the deadly cancers.

It is estimated that over 42,000 Americans were diagnosed with pancreatic cancer in 2009 -- a 12 percent increase over the year before. In the past few years there has been increased publicity of this deadly disease with the deaths of Patrick Swayze, the actor, Dr. Randy Pausch, a computer science professor at Carnegie Mellon University and author of the widely acclaimed "Last Lecture", as well as the diagnosis of U.S. Supreme Court Justice Ruth Bader Ginsberg.

But while these prominent individuals' diagnoses have increased national awareness, the fact remains that a pancreatic cancer patient diagnosed today has roughly the same chance of survival as someone diagnosed 30 years ago. Today, 95 percent of pancreatic cancer patients die within five years of diagnosis. Seventy-six (76) percent die within the first year after diagnosis. There are still no early detection tools or effective treatments. Just as it has been for decades, the majority of patients diagnosed with pancreatic cancer hear that they should get their final affairs in order, instead of hearing about treatment options to help them see another birthday, wedding anniversary, or child's graduation.

Admittedly, pancreatic cancer is a particularly challenging disease to research:

- Pancreas tissue is very difficult to obtain for research. The pancreas is located deep within the body. Therefore, most tissue samples are obtained only if a patient has surgery to remove the tumor. However, because the majority of pancreatic cancers are caught very late, only 15 percent of all pancreatic cancer patients are eligible for this surgery. Further, even if tissue is obtained at the time of surgery, the tissue sample is usually small, making this resource extremely valuable and scarce.
- Pancreatic tumors are unique in the types of cells that make up the tumor. Tumors are often comprised of a variety of cell types, including dense fibrotic cells that may contribute to the remarkable resistance of the tumor to chemotherapies.
- Participation in clinical trials is often limited because patients are extremely sick and die quickly of the disease.
- Currently, there are no biomarkers sensitive and specific enough to be useful in the diagnosis of pancreatic cancer.

It should be noted that at this point studies have demonstrated that individual pancreatic cancer patients respond differently to various treatments. Therefore, personalized medicine holds great promise for people facing pancreatic cancer. However, as is the case for many of the deadly

cancers, much more research is needed to understand these differences, as well as a system to share data and analyze similarities and differences amongst individual patients.

These challenges in pancreatic cancer are not insurmountable. But, as with research into all of the deadly cancers, it will take leadership, vision and a change in the current research paradigm at NCI. Specifically, we are calling for an increase in funding, the creation of a targeted cancers program focused on deadly cancers to provide structure and accountability on making progress on these diseases, a dedicated grant program, and expert review of grants.

I want to note that our recommendations are not about telling NCI how to do the science. We simply believe that the status quo has not worked for deadly cancers and the time has come to take specific steps to ensure that there is sufficient focus on the deadliest cancers to ensure true progress.

Deadly cancers, like pancreatic cancer, are currently not research priorities at NCI and as a consequence they are severely underfunded. For example, pancreatic cancer currently receives less than 2 percent of NCI's nearly $5 billion budget – a figure much too low to foster any significant progress against this leading cancer killer. I have included for the record a chart of NCI funding for the top five cancer killers – which includes both lung and pancreatic cancer, also two of the most deadly cancers – and their respective survival rates. This chart demonstrates in very dramatic fashion that there is a clear correlation between low investment in research and poor survival rates. When an investment has been made, the five year survival rates reflect those efforts.

Funding is obviously an important part of the problem. NCI's budget has declined by nearly $700 million, or 15 percent since fiscal year 2003, after adjusting for inflation. More importantly, NCI has not made the deadliest cancers a funding priority. As indicated in the fact sheet on deadly cancers I have included for the record, less than 18 percent of the NCI's 2008 research funding budget was dedicated to the eight deadly cancers even though these cancers cause half of all cancer deaths. Across all types of cancer combined, the NCI spent just over $7,000 per cancer death in 2008. For the eight highest-mortality cancers, NCI devoted only about $2,500.

I do want to note that Dr. Barker has reached out to the Deadly Cancer Coalition about expanding TCGA to more of the deadly cancers. We are very interested in having TCGA address more of these cancers and, specifically, the most complex problems such as improving tissue collection methods when tissue is particularly scarce. However, while efforts like TCGA and nanotechnology are important parts of the solution for deadly cancers, these efforts on their own are insufficient. Targeted funding for research into deadly cancers also will be critical, but again, on its own, is not enough. Mr. Chairman, we believe that creating structure and accountability also is absolutely essential to making progress in these diseases. Specifically, the deadly cancer community recommends establishing a targeted cancers program within the NCI for the high mortality cancers. It should include a strategic plan for progress, an annual report from NCI to Congress, and a new grant program specifically focused on the deadly cancers.

The targeted cancers program would require the NCI Director to work with staff, top scientists, patient advocates and other stakeholders to develop a plan of research activities necessary to increase survival rates for the high mortality cancers. The strategic plan would identify the steps required to reduce mortality rates for each cancer over a five year period. The plan would include specific areas of research needed, as well as an estimated budget that can be factored into the NCI's Professional Judgment Budget. It would also include NCI-wide initiatives, such as nanotechnology and TCGA, to help ensure that all deadly cancers are included in these types of programs. The strategic plan will also have the added benefit of helping the deadly cancer research community ensure that privately funded research is not duplicating federally funded research. Furthermore, we believe that annual reports on the new program are necessary to ensure accountability. Reports should indicate progress that has been made against the plan in the previous year, changes in survival rates, and newly available early detection tools or treatments.

We also recommend the establishment of a new targeted grants program to create a protected pool of research funds for the deadliest cancers. Researchers studying deadly cancers often have relatively limited initial data, due in part to the historical lack of research into these cancers. In the NCI competitive application process, grant applications with limited initial data tend to be less competitive versus applications regarding more researched cancers, such as breast and prostate. Limited data reflects high-risk/high-reward research and the NCI tends to fund "safe bets." While researchers studying the deadly cancers would be encouraged to continue to submit proposals through standard grant mechanisms, they would also have the opportunity to submit grant applications under the targeted cancers program. This additional opportunity would help to compensate for the limited existing data in deadly cancers. For example, basic research investigating the biology and progression of some of these historically under-studied cancers may be considered high risk/high reward due to lack of research data available and would not receive funding. However, it is clear that the basic biology and progression of the disease are essential building blocks of knowledge, critical to moving these fields forward. With a targeted cancer program, these grants could be evaluated in a different way and would have greater opportunities to get funded.

Additionally, grants under this program could include a directed portion, similar to the challenge grant process the NIH used to administer ARRA funding, in order to meet the goals of the strategic plan discussed above. Funding would be open both to experienced investigators and to early-career investigators to attract more scientists to this field of study. Grant review committees would include scientific experts in the specific disease areas of interest, another critical point for deadly cancers.

We have presented the idea for a targeted cancers program to the NCI and have also been working with the House and Senate sponsors of the 21st Century Cancer Access to Life-Saving Early detection, Research and Treatment (ALERT) Act. Chairman Pallone, on behalf of the deadly cancer community, I would like to commend you and Representative Capps for your leadership in drafting a House version of this bill that would establish a targeted cancer research program and many of the ideas outlined above.

Additionally, for the pancreatic cancer community, passage of HR 745, the Pancreatic Cancer Research and Education Act, introduced by Representatives Anna Eshoo and Ginny Brown-Waite, is another important step to tackling the challenges I have discussed. Specifically, this bill would put in place a strategic plan for pancreatic cancer research and establish a cancer research incubator pilot project for the highest mortality cancers. The bill would also strengthen and expand Centers of Excellence for pancreatic cancer and promote awareness of the disease amongst health professionals and the public.

The time has come to tackle the hardest and most complex problems. We must fund new progress and give researchers the opportunity to do more with more, not less. It is by solving the hardest problems that we will likely see the greatest rewards for the entire field of cancer research. We have seen greatly reduced mortality rates of diseases like breast cancer, prostate cancer, AIDS and childhood leukemia as a result of targeted, comprehensive and well-funded programs. These research programs have produced early detection tools and effective treatments for these cancers. We must also shine a bright light on the deadliest cancers to achieve these same results.

Mr. Chairman, in conclusion, I want to thank you and members of the subcommittee again for allowing me the time to testify. Creating a targeted research program for the deadly cancers that includes a strategic plan and a dedicated grants program reviewed by scientific experts in the respective fields, is a critical first step toward reducing the mortality rates and developing early detection tools and treatments for the deadliest cancers.

The Pancreatic Cancer Action Network, along with the Deadly Cancer Coalition, hopes that in the near future a diagnosis of ovarian, brain, myeloma, stomach, esophageal, lung, liver, or pancreas cancer does not carry an automatic death sentence, but rather the first step in effectively treating and ultimately curing the disease. With your help, we know this hope can be a reality for all cancer patients.

In addition to the Pancreatic Cancer Action Network, this testimony is endorsed by the following organizations:

American Association for the Study of Liver Diseases
American College of Gastroenterology
American Gastroenterological Association
American Liver Foundation
American Pancreatic Association
Digestive Disease National Coalition
Esophageal Cancer Action Network (ECAN)
Hepatitis B Foundation
Hepatitis Foundation International
International Myeloma Foundation
Leukemia & Lymphoma Society
Lung Cancer Alliance
National Brain Tumor Society
National Ovarian Cancer Coalition
National Pancreas Foundation

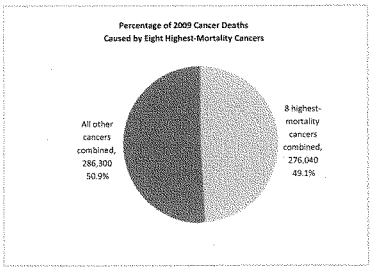
Ovarian Cancer National Alliance
Sarcoma Foundation of America
Society of Gynecologic Oncologists

Attachments:
The Deadly Cancer Fact Sheet
Top 5 Cancer Killers Chart

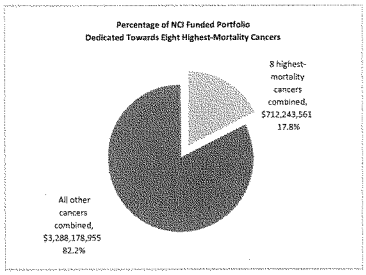
The Deadliest Cancers

Nearly half of the 562,340 cancer deaths expected in 2009 will be caused by eight forms of cancer with five-year relative survival rates of less than 50%: ovary (45.5%), brain (35.0%), myeloma (34.9%), stomach (24.7%), esophagus (15.8%), lung (15.2%), liver (11.7%), and pancreas (5.1%).

2009 Total Cancer Deaths
562,340



2008 Total Cancer Funding
$4,000,422,516



Most Common Causes of Cancer Incidence, Deaths, and Five-year Relative Survival Rates 2009

	2009 Incidence	2009 Deaths	Five-year Relative Survival Rate
Pancreas	42,470	35,240	5.1%
Liver	22,620	18,160	11.7%
Lung	219,440	159,390	15.2%
Esophagus	16,470	14,530	15.8%
Stomach	21,130	10,620	24.7%
Myeloma	20,580	10,580	34.9%
Brain	22,070	12,920	35.0%
Ovary	21,550	14,600	45.5%
Leukemia	44,790	21,870	50.0%
Colon	106,100	49,920	64.4%
Non-Hodgkin	65,980	19,500	64.5%
Kidney	57,760	12,980	66.5%
Urinary Bladder	70,980	14,330	79.8%
Uterine Corpus	42,160	7,780	82.9%
Breast	194,280	40,610	88.7%
Melanoma of the Skin	68,720	8,650	91.2%
Prostate	192,280	27,360	98.9%

Deadliest Cancers: cancers for which the five year survival rate is less than 50 percent

Unless otherwise noted, all statistical data is from the American Cancer Society 2009 Facts & Figures. All NCI funding data is from the 2008 NCI Funded Research Portfolio as of April 2009 (excludes Extramural Support and Projects Assigned $0 and $1 funding), available at: http://fundedresearch.cancer.gov/.

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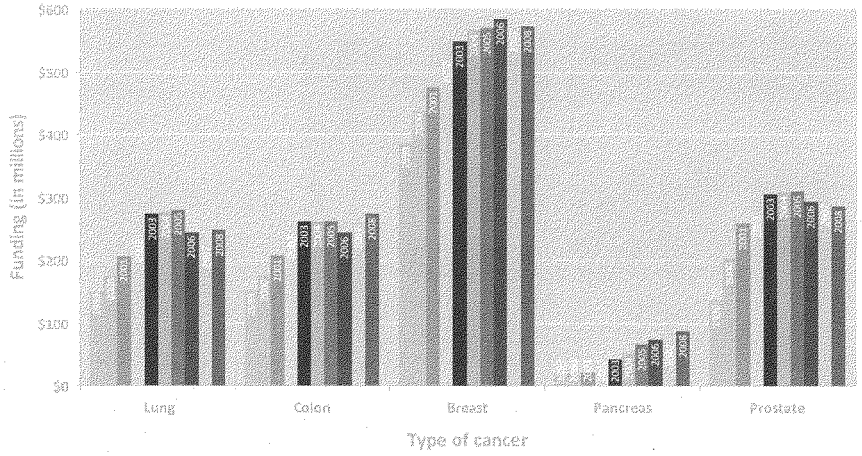
National Cancer Institute Annual Funding
Top Five Causes of Cancer Death
1999-2008



Pancreatic cancer is the 4th leading cancer killer and continues to be the least funded among the top five cancer killers.

Source: National Cancer Institute Funded Research Portfolio. http://fundedresearch.cancer.gov/. Accessed April 2009.

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Government Affairs Office | 1050 Connecticut Ave. NW, 10th Floor | Washington, DC 20036 | Ph: 202.742.6699 | Fx: 202.742.6518
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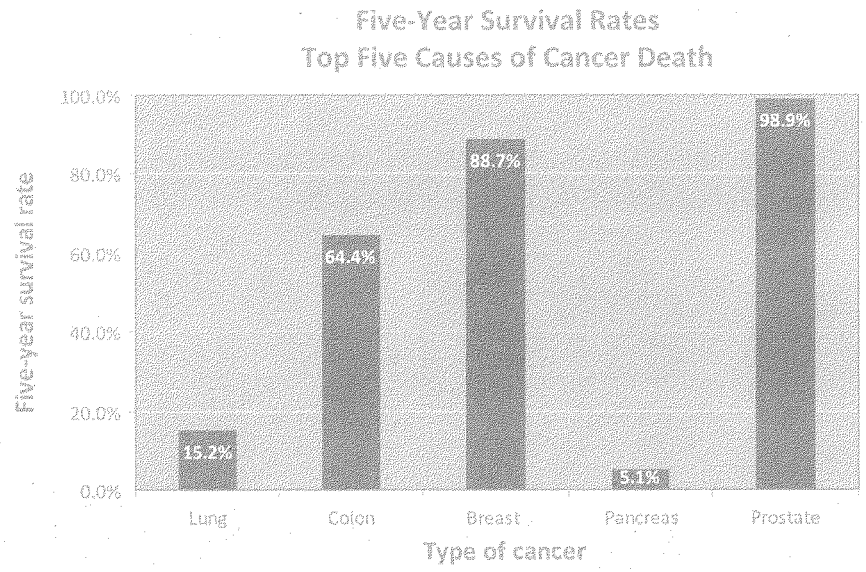

Low Funding Precludes Scientific Progress
95% of pancreatic cancer patients die within five years from their diagnosis; a statistic largely unchanged in the past 30 years. Additionally, in the same timeframe, the five year survival rate for all forms of cancer has risen from 50% to 66%, and some cancer survival rates are now close to 90% or above.

Source: American Cancer Society. Cancer Facts and Figures, 2009. Atlanta: American Cancer Society, 2009.

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Mr. PALLONE. Thank you.
Dr. DiPaola.

STATEMENT OF ROBERT S. DIPAOLA

Dr. DIPAOLA. Good afternoon, Mr. Chairman and members of the subcommittee. My name is Dr. Robert DiPaola. I am director of the Cancer Institute in New Jersey, our State's only NCI-designated comprehensive cancer center. The mission of CINJ, similar to 65 other NCI-designated centers nationwide, is to reduce cancer incidence, morbidity and mortality through multidisciplinary cancer research including researchers in the laboratory collaborating with physician researchers in the clinic. I am also a member of the American Association of Cancer Research, AACR, which is dedicated to advancing cancer research, to prevent and cure cancer through research, education, communication and collaboration. Thank you for convening this hearing and recognizing that cancer research is critical to making and translating the discoveries needed to reduce the toll that cancer takes on the people and the economy of our Nation. Through its oversight and legislative activities, this committee has played an important role in advancing cancer research, and I commend Chairman Pallone and all the members of the committee for their achievements and ongoing commitment to this national priority.

Today we estimate, as you have heard, one in two men and one in three women will develop cancer in their lifetimes. This year alone, almost 1.5 million Americans will be diagnosed with cancer and more than half a million Americans are expected to die of the disease. That is approximately 1,500 people a day, one per minute. The toll on the economy is staggering and predicted to increase with the increased risk of cancer to our aging Baby Boomer population if there is not dramatic intervention supporting the need to increase the investment in cancer research.

The Nation's prior investment in cancer research is reaping benefits to millions of Americans. According to the ACS, as you just heard, the 5-year survival rate for cancer has improved. The overall 5-year survival rate improved to approximately 66 percent compared to 50 percent in earlier years but we now need to go further, especially for rare and aggressive cancers. An example of a major advance that is providing for accelerated progress is the sequencing of the human genome and The Cancer Genome Atlas, as you just heard from Dr. Barker, which is now allowing us to answer difficult questions more rapidly. Research to improve diagnosis, treatment and prevention of cancer can improve patient outcome.

Currently, only approximately 5 to 10 percent of drugs that are first tested in cancer clinical trials are ultimately approved. We now have the models to improve this rate including a better understanding of molecular pathways that allow a more targeted and individualized approach. Much of the progress made in this country against cancer has been the result of organizations such as the AACR and of research in cancer care done at NCI-designated cancer centers. A culture of collaboration is also a hallmark of NCI-designated cancer centers in which collaboration between laboratory and clinical researchers and collaboration with other research institutions, industry and other cancer centers is encouraged.

At CINJ, as an example, with NCI's support, we have been able to foster a consortium model with researchers at multiple institutions in the State including the best researchers at CINJ, Rutgers and Princeton universities. These efforts recently have led to the discovery of critical metabolic pathways involved in tumor cell starvation and survival and translated these laboratory findings into several clinical trials that are now ongoing and available for patients with both common and more rare cancers that are attempting to better starve tumor cells.

Another area of funded research important to improve outcomes for patients is comparative effectiveness research which seeks to optimize emerging and existing therapies. For example, a team of researchers in epidemiology recently published a landmark study that better defines the use of hormone therapy for men with early stages of prostate cancer. Other novel therapeutic trials with NCI support include a recently opened clinical trial to look at harnessing our immune system to tackle pancreatic cancer and other cancers, in this case administering in pancreatic cancer a new vaccine combination directly into the tumor, now offering many patients in need a new clinical trial option.

Other efforts to foster collaboration include the work of the AACR that underpins many efforts and groups such as Stand Up To Cancer. This new initiative provides large grants awarded to multidisciplinary research dream teams.

Cancer's economic burden is staggering. The NIH estimates that in 2008 the overall cost to society was more than $200 billion. Fortunately, we are at a most promising time in cancer research, as you have heard, but much more remains to be done. I think we have the potential to accelerate through this tipping point in time by supporting a new era of cancer treatment and prevention and gain on our investment to reduce the toll of cancer on the people and the economy of our Nation. Thank you.

[The prepared statement of Dr. DiPaola follows:]

ROBERT WOOD JOHNSON
MEDICAL SCHOOL
University of Medicine & Dentistry of New Jersey

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Testimony before the House Committee on Energy and Commerce Subcommittee on Health - March 23, 2010

Robert S. DiPaola, MD
Director, The Cancer Institute of New Jersey and
Member, American Association for Cancer Research

Good morning Mr. Chairman and Members of the Subcommittee. My name is Dr. Robert DiPaola, and I am the Director of The Cancer Institute of New Jersey (CINJ), our State's only National Cancer Institute (NCI)-designated Comprehensive Cancer Center at UMDNJ-Robert Wood Johnson Medical School. The mission of CINJ, similar to the 65 other NCI-designated Centers Nationwide, is to reduce cancer incidence, morbidity, and mortality through multi-disciplinary cancer research. I am also a member of the American Association for Cancer Research (AACR). The mission of AACR, as the world's oldest professional organization dedicated to advancing cancer research, is to prevent and cure cancer through research, education, communication, and collaboration.

Thank you for convening this hearing and recognizing that cancer research is critical to making and translating the discoveries needed to reduce the toll that cancer takes directly on the people and the economy of our Nation. Through its oversight and legislative activities, this Committee has played an important role in advancing cancer research at the national and local levels and I commend Chairman Pallone and all of the Members of the Committee for their achievements and ongoing commitment to this national priority.

Today, we estimate that one in two men and one in three women will develop cancer in their lifetimes. This year alone almost 1.5 million Americans will be diagnosed with cancer and more than half a million Americans are expected to die of the disease - that's approximately 1,500 people a day, and one per minute. In fact, in the United States, cancer accounts for nearly one of every four deaths (American Cancer Society, *Cancer Facts and Figures 2009*). The toll on the

economy is also staggering and predicted to increase if there is not dramatic intervention, supporting the need to increase investment in cancer research. Compounding these concerns is the increased risk of cancer to our aging "baby boomer" population, confirming our need to increase the investment in preventive and therapeutic research, which has the promise to decrease health care spending by effectively treating and preventing cancer before the disease becomes advanced and more costly.

Successes and Challenges

The Nation's investment in cancer research is reaping substantial benefits for millions of Americans. According to the American Cancer Society (ACS) (ACS, *Surveillance and Health Policy Research*, 2009), the five-year survival rate for cancer has improved. In a comparison of the time period 1996 to 2004 with the period 1975 to 1977, the overall five-year survival rate has improved from 50% to 66%. Accordingly, the five-year estimated survival rate for many of the most common types of cancer have improved in the same time frame: breast 75% to 89%, prostate 69% to 99%, and colon 52% to 65%. Some less common cancers have also improved, but remain at low rates of five-year survival. For example, Pancreas cancer has a 5% five-year survival compared to 3% in the past and liver cancer 11% versus 4% in the past, according to the *ACS Cancer Facts and Figures 2009*. Therefore, despite substantial improvements, we need to go further, and we now have additional technology to move research forward at a faster pace. A major advance that is providing for accelerated progress is the sequencing of the human genome, which now is allowing us to answer difficult questions more rapidly. According to the NCI FY2011 annual plan and budget report, "what once took tens of millions of dollars and years to accomplish can now be done in about a week for $10,000 or less, thanks to next-generation sequencing technology." To capitalize on the remarkable scientific and technical advances, however, we need to continue to invest. We need to reinforce our army of researchers who have already accelerated our ability to translate discoveries into results for patients, through research in **diagnosis, treatment and prevention** of cancer.

Research to improve **diagnosis** of cancer at an earlier stage of disease improves our opportunity to have an impact on healthcare. It has been long known that the chance for a patient to be cured when diagnosed in early stages of cancer is far greater than the rate of cure for patients

diagnosed with more advanced stages of disease. Building on recent research discoveries identifying biomarkers of early disease, the opportunity to translate to effective new means of diagnosis is better than ever before. A major challenge, however, is limited funding for the clinical trials necessary to validate these approaches. Another challenge is the integration of many disciplines, including basic laboratory research, clinical research, and efforts in information technology to align specific genetic and molecular findings with clinical outcomes to accelerate high impact discoveries. Therefore, it will be important to increase efforts in fundamental basic research to continue to discover genetic and molecular abnormalities, efforts in translational research to move those discoveries to patients, efforts in collaborative research to combine many institutions to complete large clinical studies, and the integration of information technology to catalyze research efforts by providing needed data for researchers.

In regard to **treatment**, we are beginning to more effectively translate scientific discoveries directly to new drugs for patients. There are a panoply of new anti-cancer drugs being studied in clinical trials, but very few will be approved without efforts to optimize our approach. In fact, approximately 5-10% of drugs that are first tested in cancer clinical trials are ultimately approved by the US Food and Drug Administration. We now have new models to improve this success rate, all of which can be enhanced with increased research funding. First, we have improved the success of drug development by better understanding molecular pathways that allow drug developers to take a more targeted approach. This has led to the success of the drug imatinib, which has revolutionized the treatment of chronic myeloid leukemia by targeting and inhibiting a specific molecular pathway responsible for this cancer. Second, we have improved the assessment of drug concentrations in the blood and the effect on cancer cells in clinical trials through better measurements, imaging, and new clinical trial designs. Third, we are improving the ability to individualize therapies, thereby improving results for patients, through molecular characterization of cancer cells. Fourth, we now have an improved our understanding of not only what makes a cancer cell grow and spread, but how a cancer cell survives drugs, radiation, and other stresses, and how to use this information to improve the effectiveness of our therapies.

Efforts to reduce the toll of cancer on the people of our Nation could be maximized by a greater investment in **prevention**. Efforts to develop preventive agents have been successful, including

the approval of agents for prevention of breast cancer and vaccination to prevent liver and cervical cancer, with high impact by reducing cancer and the associated economic challenges. With continued support, further impact is possible with therapeutic research possibilities, increased efforts in behavioral research to identify methods to change lifestyles, and the potential for better identification of high-risk populations through advances in genomic technology for a more personalized approach.

The Importance of Collaboration and NCI-Designated Cancer Centers

Much of the progress made in this country against cancer has been the result of research and cancer care done at NCI-designated Cancer Centers, of which 65 today are scattered throughout the United States. The NCI-designated Cancer Centers like the Cancer Institute of New Jersey (CINJ) are a major force in discovering the cures for cancer, and of development of more effective approaches to prevention, diagnosis, and therapy. NCI-designated Cancer Centers deliver medical advances to patients, educate healthcare professionals and the public, reach out to underserved populations, and collaborate with colleagues in academia and industry to bring the latest medicines directly to patients. As noted in the NCI FY2011 annual plan and budget report, "Cancer Centers are key participants-the linchpin, some might say-across virtually every NCI initiative."

A culture of collaboration is also a hallmark of NCI-designated Cancer Centers, as well as many NIH-supported grants that require multidisciplinary, multi-investigator, and consortium efforts. Collaboration with pharmaceutical and biotechnology companies also helps expedite drug development. In an era when targeted cancer treatments are now a reality, the challenge we face is to continue to turn groundbreaking discoveries into lifesaving care in the clinic at an even greater speed. By fostering collaborations, we are laying the groundwork for breakthrough discoveries in cancer research that will translate into cutting-edge treatments for cancer patients.

At CINJ, we have emphasized and fostered a consortium model with local researchers at multiple institutions including UMDNJ, Rutgers and Princeton Universities. For example, efforts have led to combined science from a collaboration of laboratory and clinical researchers that resulted in the discovery of critical metabolic pathways involved in tumor cell survival and

launched several clinical trials for patients with lung, breast, colon, skin and prostate cancer that are attempting to better starve tumor cells of their nutrients. NCI-funded centers and efforts like these provide opportunities for patients never before available, and a route to improve the outcomes through effective cancer research.

Another area of funded research important to improve the quality of care of patients and reduce health care costs is comparative effectiveness research. Comparative effectiveness research seeks to optimize the use of emerging and existent therapies. For example, a team of researchers in epidemiology at CINJ recently published a landmark study that defined the proper use of hormone therapy for men with early stages of prostate cancer, which will improve patient outcomes while hopefully leading to reduced healthcare expenditures.

Other novel therapeutic trials at CINJ include a recently opened clinical trial to look at harnessing our immune system to tackle pancreatic cancer. Researchers are testing the effectiveness of a new vaccine combination injected directly into the tumor. If the results prove successful this will improve patient outcomes for one of the deadliest types of cancer. This trial is supported by the NCI and would not be possible without the ongoing research at CINJ.

Other efforts to foster collaboration include the work of AACR that underpins groups such as Stand Up To Cancer. This new initiative provides large grants awarded to research "Dream teams," headed by multiple principle investigators who bring expertise and resources from basic, translational, and clinical research areas to bear on a single cancer problem.

Investment

It may seem to some that increasing federal support for cancer research is something the nation can't afford right now. But we can't afford not to maintain our investment – given demographic shifts now underway. Cancer's economic burden is staggering. The National Institutes of Health estimates that in 2008 the overall cost to society was more than $200 billion: approximately $93 billion for direct medical costs, $116 billion for loss of productivity due to premature death, and approximately $19 billion for loss of productivity due to the acute illness and time necessary to undergo cancer treatment. Our population is aging rapidly, and cancer is

largely a disease of aging. As a result, the total economic burden of cancer in the United States will likely continue to increase and interventions are required now to bend this health expenditure curve.

We are at a most promising time in cancer research. Our nation's investment in cancer research has brought us to the forefront of a revolution. But much more remains to be done. We have the potential to accelerate through this tipping point in time to welcome a new era of cancer treatment and prevention and gain on our investment to reduce the toll of cancer on the people and economy of our Nation.

Mr. PALLONE. Thank you, Dr. DiPaola.
Dr. Allen.

STATEMENT OF JEFF ALLEN

Mr. ALLEN. Good afternoon, Chairman Pallone, Mr. Shimkus and members of the subcommittee. It is an honor to testify before you today. I am Dr. Jeff Allen, executive director of Friends of Cancer Research, a cancer research advocacy organization and think tank based in the Washington, D.C., area. I would like to thank the staff of this committee, who have worked tirelessly in putting together this hearing.

The foundation of Friends of Cancer Research, Dr. Ellen Sigal, could not be here today as she is with a loved one right now who is being treated for a rare cancer. Dr. Sigal started this organization 15 years ago after having lost a sister to breast cancer, her father to prostate cancer and mother to pancreatic cancer. This is as personal for her as it is for you, Mr. Chairman, and likely everyone in this room including myself, who have been deeply affected by this terrible disease. It is with this in mind that I am here today to express what we feel needs to be done to end the suffering that millions of cancer patients and their families experience every year. Exceptional progress has been made in the treatment of cancers, due in large part to the investments in biomedical research. However, significant hurdles stand in the way of ending the burden of cancer.

Today it is estimated that it requires over $1 billion, 12 to 15 years and 1,000 patient volunteers to get a single drug to market. Chairman Pallone, 15 years to translate a new discovery to a therapeutic today by today's rates would mean a loss of almost 8.5 million Americans, approximately the population of your home State of New Jersey.

The funding allocation to biomedical research as a part of the American Recovery and Reinvestment Act presented a renewed opportunity for American investigators to carry out research projects that otherwise may not have been possible. However, in order to truly halt the devastating impact of cancer, a comprehensive approach is needed. First, increased collaboration across all sectors is needed to turn the next corner of scientific advancement. The NCI continues to be an engine-driving process but we must also acknowledge the need for collaboration with other agencies. For example, increased scientific capacity at the FDA is needed to ensure that the discoveries being made at the NCI get to patients as safely and efficiently as possible.

Second, the historic health reform bill passed this week takes many important steps to ensure that breakthroughs from research are available, accessible and affordable to all Americans. This includes the expansion of comparative effectiveness research, which can help to provide improved information for patients and their health care providers. While it will take careful thinking to finalize many of the details moving forward, we look forward to working with members of this committee and others to ensure the success of these programs.

Finally, we must also tear down the silos that exist in biomedical research and focus on the common goal of reducing the cancer bur-

den. Classifying and studying cancers based on their molecular characteristics as opposed to just their tumor site is in many cases the direction that science is leading. It is through the success of research that common molecular targets for abnormal growth have been identified in multiple cancers. While this adds to complexity, it also creates opportunities for shared success. This is not to diminish the important work of targeted focus but we must let our work support and inform those fighting for the common goal on our alternative fronts. The time of scientific opportunity is upon us. In order to ensure that multiple integral components of the health care system are prepared for the future of cancer research, we must act now.

We respectfully ask that members of this committee, the Congress and the Administration be steadfast in their commitment to ending cancer. I cannot emphasis enough the need for collaboration. The advocacy community and entire research community must embrace our common goal and support science and collaboration that will enhance the battle against cancer on all fronts. It is our responsibility to represent patients' needs and what must be done to end the burden of all diseases. Thank you.

[The prepared statement of Mr. Allen follows:]

NCI Cancer Research: Today's Progress; Tomorrow's Challenges

Jeff Allen, Ph.D
Executive Director
Friends of Cancer Research

Testimony Before
Committee on Energy and Commerce
Subcommittee on Health
United States House of Representatives

March 23, 2010

Introduction

Good afternoon, Chairman Pallone, Ranking Member Deal, Mr. Shimkus, and Members of the Subcommittee. I am Dr. Jeff Allen, Executive Director of Friends of Cancer Research, a cancer research advocacy organization and think tank based in the Washington area. I would like to thank the staff of this committee who have worked tirelessly in putting together this hearing. It is an honor to testify before you today on the importance of cancer research at the National Cancer Institute (NCI) and across all sectors. My testimony is intended to give perspective on the vital need for NCI to be in direct collaboration with other federal health agencies, the important role that public-private partnerships can play in spurring innovation, and the need to tear down the silos that currently exist within the biomedical research community.

The founder of Friends of Cancer Research, Dr. Ellen Sigal, could not be here today, as she is with a loved one right now that is being treated for a rare cancer. Dr. Sigal started this organization 15 years ago after having lost a sister to breast cancer, her father to prostate cancer, and mother to pancreatic cancer. This is as personal for her, as it is for you Mr. Chairman, and likely everyone in this room, including myself, who have been deeply affected by this terrible disease. It is with this in mind that I am here today to express what we feel needs to be done to end the suffering that millions of cancer patients and their families experience every year.

Nearly forty years ago President Nixon declared war on cancer by signing *The National Cancer Act* (P.L. 92–218) into law, and said, "The time has come in America when the same kind of concentrated effort that split the atom and took man to the moon should be turned toward conquering this dreaded disease. Let us make a total national commitment to achieve this goal."[1] Four decades later, we also have a President that has committed to ending cancer in our lifetime.

Over the past forty years, exceptional progress has been made in the treatment of cancers, due in large part to the investments in biomedical research. This has allowed for an understanding of the underlying biology of the disease in much more scientific detail. For example, since the declaration of a war on cancer, blood cancers have gone from being classified as five different types of leukemia and lymphomas to nearly 90 different disease subtypes based on biological characteristics. This has lead to the development of more tailored treatments that are more effective and in many cases less toxic. The current five-year survival rates for leukemia and lymphomas now average upwards of 70%.[2] That is at least twice, and in some cases, four times what they were in 1970.[3]

While this type of progress is compelling and observed in a few other cancers as well, there is much more to be done to alleviate the burden of cancer. It is estimated that, in 2009, nearly 1.5 million Americans will have been diagnosed with some form of cancer. As a result, our healthcare system will be strained an additional $228 billion.[4] Most

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[1] Remarks by the President in State of the Union Address: January 22, 1971 http://www.c-span.org/Content/HTML/Executive/Transcripts/nixon1971.pdf Accessed 3/19/10

[2] Allison, M: *Is Personalized Medicine Finally Arriving?* Nature Biotechnology. Vol. 26; No. 5, May 2008: 509-17.

[3] Facts 2009-2010. The Leukemia & Lymphoma Society. http://www.leukemia-lymphoma.org/attachments/National/br_1247234696.pdf Accessed 3/19/10

[4] The American Cancer Society: http://www.cancer.org/docroot/MIT/content/MIT_3_2X_Costs_of_Cancer.asp Accessed 3/19/10

importantly, this disease will claim the lives of 562,340 mothers, fathers, grandparents, sisters, brothers, and friends, per year.[5]

Biomedical research is an enterprise that is built on the benefits of capitalism, and all sectors gain from and are required for its success. Today, it is estimated that it requires over $1 billion, 12 to 15 years, and thousands of patient volunteers to get a single drug to market. Fifteen years to translate a new discovery to a therapeutic treatment, by today's rates, results in the loss of almost 8.5 million Americans approximately the population of state of New Jersey.[6]

Let us join together and commit that hearings like this, which are so important to refocus on these issues, will not end with a few comments for the record, but will actually bring about new action. There is an ever growing need for bipartisanship; to not let political posturing hinder the progress we have made as we strive to discover new life-saving treatments and therapies.

The strides forward in cancer research have been large, but due to the complexity of the disease, new multi-institutional approaches must be fostered. The funding allocated to biomedical research as a part of the American Recovery and Reinvestment Act of 2009 (ARRA) presented a renewed opportunity for American investigators to carry out research projects that otherwise may not have been possible. The programs supported by the National Caner Institute (NCI), from both the ARRA and the traditional budget process, continue to advance cancer research. However, a sustained funding commitment for biomedical research is needed to build on our prior investments and see that the returns on those investments reach the clinics and benefit the millions of patients, as they were designed to do.

Sustained funding is just one component to reducing the cancer burden.

In order to truly halt the devastating impact of cancer, a comprehensive approach is needed. The NCI and its programs are an engine that drive progress, but increased collaboration with other entities, both public and private, are needed to turn the next corner of scientific advancement.

We must also acknowledge the need for a streamlined process in getting the discoveries being made at the NCI to patients, as safely and efficiently as possible.

To accomplish this Congress needs to support increased scientific capacity of the Food and Drug Administration, which serves as the nexus between the progression of laboratory research and the clinical use of new therapies.

We ask that you support President Obama's fiscal year 2011 budget request which contains a much needed 6% increase to the budget authority for the FDA, including $25 million allocated to Regulatory Science, which aims to develop, assess and provide new, validated tools and approaches to better evaluate the utility of new medical products. This initiative has been spearheaded by the visionary leadership of FDA Commissioner Dr. Margaret Hamburg.

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[5] NCI Surveillance, Epidemiology and End Results: http://www.seer.cancer.gov/ Accessed 3/19/10

[6] United States Census Bureau: http://factfinder.census.gov/servlet/SAFFPopulation?_submenuId=population_0&_sse=on Accessed 3/19/10

The success of the NCI cannot be measured solely as the research accomplishments facilitated by the institute, but rather by its contribution to the larger goal of reducing the national cancer burden, and this cannot be achieved alone. It is critical to also examine the impact of other federal agencies on the ability for NCI-based discoveries to ultimately improve the lives of patients. For example, in 2007 the Food & Drug Administration (FDA) Science Board declared the agency's "mission at risk" due to its eroded scientific foundation.[7] Clearly, without a scientifically rigorous regulatory body, discoveries facilitated by NCI-based research could be inefficiently or inappropriately evaluated, and ultimately not achieve the envisioned improvement to patient's lives.

Even prior to the report that highlighted the need to advance the science of regulation, the FDA acknowledged the need for assembling oncology expertise at the agency through the establishment of the Office of Oncology Drug Products.[8] While this has made several improvements to the regulation of oncology programs, a comprehensive FDA Oncology Program is still needed to facilitate and increase the transparency of intra-agency collaborations, standardize review guidelines, and establish jurisdiction and sufficient interactions between FDA Centers that are frequently involved in the review of increasing complex new product applications. A robust cancer program can also build upon existing collaborations in order to increase the scientific methodologies used by the agency.

The NCI knows the power of such collaborations first hand through the development of the NCI-FDA Interagency Oncology Taskforce (IOTF).[9] This has allowed for new training mechanisms and an exchange of ideas that capitalizes on the great expertise at both agencies in order to efficiently translate NCI-based discovery to patient benefit. However, with additional resources the IOTF could expand its current portfolio to include additional scientific programming. It is in that spirit that on February 24th this year, the leaders of the National Institutes of Health (NIH) and the FDA announced the formation of the Joint Leadership Council in order to take the necessary steps to work together to advance the missions of each respective agency.[10]

It is these types of collaborations that are needed across the federal health agencies to streamline cancer research, detection, treatment, prevention, surveillance, product regulation, care delivery, reimbursement of services, and to learn from all of these cancer-related functions as a routine by-product of care. This will ultimately lead to increased survivorship, reduction of cancer incidence and mortality, and improvement of the lives of all who may face this disease.

The collaboration cannot occur within federal government agencies alone. Public-private partnerships, like that of the Foundation for the NIH or the Reagan Udall Foundation for the FDA, are the direction that we must go in order to capitalize on all research being conducted around the world.

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[7] Report of the FDA Subcommittee on Science and Technology: FDA Mission at Risk. November, 2007: http://www.fda.gov/ohrms/dockets/AC/07/briefing/2007-4329b_02_01_FDA%20Report%20on%20Science%20and%20Technology.pdf Accessed 3/20/10

[8] FDA News Release, July 16, 2004: http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/2004/ucm108326.htm Accessed 3/20/10

[9] NCI-FDA Interagency Oncology Taskforce: http://otir.cancer.gov/programs/partnerships_iotf.asp Accessed 3/20/10

[10] United States Department of Health and Human Services: http://www.hhs.gov/secretary/speeches/sp20100224.html Accessed 3/19/10

Last week, the Biomarker Consortium, a public-private partnership through the Foundation for the NIH, announced the opening of the I-SPY2 TRIAL. This clinical trial will utilize an innovative new model that use biomarkers from individual patients' tumors to screen promising new treatments for breast cancer and identify which treatments are most effective in specific types of patients. This will allow researchers to use early data from one set of patients to guide decisions about which treatments might be more useful for patients later in the trial, and eliminate ineffective treatments more quickly. Included in this public-private collaboration are NCI, FDA, the Center for Medicare and Medicaid Services (CMS), the Pharmaceutical Research and Manufacturers of America (PhRMA), the Biotechnology Industry Organization (BIO), major pharmaceutical companies, and numerous non-profit medical research organizations.[11] It is through collaboration that true progress will continue to be made.

In addition to fostering multi-agency and multi-institution collaboration, we must address the barriers to advancing the work achieved through NCI programs by modifying current policies. This includes the need for the streamlining of intellectual property agreements between academia, government, and industry, modifications to the HIPPA privacy rules that ensure patient protection but don't stand in the way of research, and data collection.

The historic health reform bill passed this week, developed by this committee and others takes many important steps to aid cancer research and ensure that breakthroughs from research are available and accessible to all Americans. We applaud the protections it provides for patients by prohibiting insurance discrimination due to a pre-existing condition. The provisions that safe guard the coverage of routine costs of care for patients that participate in a clinical trial will undoubtedly allow more cancer patients to participate in clinical research as an option of their care. This is a critical step forward in alleviating the challenges created by the currently low levels of participation in oncology trials. Numerous steps were also included to help provide much needed access to important tools for prevention, the ultimate defense against cancer. However, we must remain steadfast in our research support to develop even more preventive measures for the many cancers that we have no current means to prevent.

Another component of the health reform bill that Congress should be commended for addressing is the expansion of comparative effectiveness research (CER) programs. Additional support for CER can help to provide improved information for patients and their healthcare providers as they decide the best course of treatment. A focus on strengthening the information technology (IT) infrastructure in this country will help generate additional evidence to inform health outcomes research and CER.[12] In fact, the development of large-scale data networks will create an expansive collection of outcomes data for which comparisons of different treatment options can be performed. Furthermore, the use of harmonized data networks will help increase transparency to research priorities and generate further hypotheses for clinical studies based upon subpopulation characteristics, which in turn, will help to further advance "personalized" medicine.

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[11] I SPY 2 TRIAL (**I**nvestigation of Serial **S**tudies to **P**redict **Y**our **T**herapeutic **R**esponse with **I**maging **A**nd mo**L**ecular Analysis 2): http://ispy2.org/ Accessed 3/19/10

[12] Improving Medical Decision Making Through Comparative Effectiveness Research: http://focr.org/files/CER_REPORT_FINAL.pdf Accessed 3/19/10

In order for these activities to be successful we will need the previously described agency collaborations to develop research priorities, design appropriate study methodologies, identify of the most appropriate agency/organization to conduct the CER studies, as well as provide the resources necessary.

The NCI should be at the center of this type of work, and already has significant expertise in the development of data networks for cancer research that can support the development of more personalized medicine as well as be utilized or serve as a model for other health areas.

To begin to address the challenges associated with translating early phase research to clinically meaningful treatments, the health reform bill establishes the Cures Acceleration Network. This provision aims to address areas of high medical need and support future innovation in such areas by providing directed funding and streamlining processes required for the development of a potentially beneficial medical product.

These provisions in the health reform bill hold great promise for the future health of America. While it will take careful thinking to finalize many of the details moving forward, we look forward to working with members of this committee and others through the implementation process to ensure the success of these programs.

We must also tear down the silos that exist in biomedical research and focus on how all sectors can work toward the common goal of reducing the cancer burden.

Advances in cancer research have redefined how cellular abnormalities associated with cancer development and progression are studied and treated. Basic research findings have revealed that unregulated cell growth is often the result of altered signaling mechanisms that frequently involve multiple, complex molecular signaling pathways. This phenomenon is observed in many different cancers no matter what their tissue of origin may be. While the specific abnormality or mutation may likely be different in different cancers an improved understanding of the biology of cancers has identified potential commonalities that, when identified, may allow effective treatments to be utilized in multiple cancers that have been historically categorized differently based on their tumor site.

Classifying and studying cancers based on their molecular characteristics as opposed to just their tumor site is in many cases the direction that science is leading. This alternative approach in classification of different cancers has, and will continue to parse the number of people that actually have the same form of disease. Much like the subtypes observed in blood cancers, similar subpopulations are being defined in other cancers. For instance we now understand that "breast cancer" is a collection of hundreds of molecularly defined different diseases. This causes many more cancers to actually be "rare" diseases than originally thought.[13] Attention to this growth in the overall number of rare disease has been shown by NIH Director, Dr. Francis Collins,

[13] A rare disease is defined as a disease that affects fewer than 200,000 people in the United States. *The Orphan Drug Act of 1983* (P.L. 97-414)

through his exemplary leadership of the NIH effort to develop new therapeutics for rare and neglected diseases.[14]

The identification of multiple signaling pathways and their molecular components involved in the complexity of cellular communication has created hundreds of targets for potential new treatments. In fact, several effective cancer treatments have been shown to provide great benefit in multiple cancer types that may have common characteristics. For example, both imatinib (Gleevec®) and bevacizumab (Avastin®) target specific cellular components and have been shown to be effective in different types of cancers that may have historically thought to be very different from one another. It is through the success of research that these common molecular targets responsible for abnormal growth have been identified in multiple cancers. Many experts speculate that the future of cancer research and treatment will involve the combined use of multiple targeted agents that are developed and utilized based on the analysis of tumor characteristics. While this presents numerous challenges to developing, regulating, and utilizing such a treatment approach, it provides a great hope for the future of cancer research.

The beneficial effect of the combination is often greater than the sum of its individual parts. This will hopefully hold true for the future of cancer therapies themselves, but the principle will also need to be applied by all the components of the cancer research enterprise if we are to accelerate the pace to reduce the burden of cancer.

In order to create a synergistic effect in cancer research, existing institutional barriers will need to come down with a renewed focus on the common goal. While currently it is true that the health burden due to cancer can be seen greater in different diseases, taking from one to give to another is not an effective strategy. This is not to diminish the important work and targeted focus, but we must let our work support and inform those fighting for the common goal on an alternative front.

The field of cancer research has built an unprecedented infrastructure that needs to be further capitalized on. The NCI currently has 65 designated cancer centers that should encourage both internal and inter-center coordination of research.[15] Philanthropic institutions have facilitated great breakthroughs through goal-oriented funding. Tension continues to exist between individual initiated research and large scale science, often leading to difficult decisions of supporting one over another. In reality, we need support for all types of research with increased accountability, clear targeted goals, enhanced collaboration, and support for one another's efforts.

The time of scientific opportunity is upon us. In order to ensure that the multiple, integral components of the health care system are prepared for the future of cancer research and treatment we must act now. In order to ultimately and successfully reduce the burden due to cancer, a renewed and unified commitment is needed – including researchers and caregivers, government officials and congress, industry and payors, patients and advocates. It is time for a new, unified approach to combating cancer as a whole.

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[14] NIH Press Release, May 20, 2009: http://www.nih.gov/news/health/may2009/nhgri-20.htm Accessed 3/20/10

[15] NCI Designated Cancer Centers: http://cancercenters.cancer.gov/cancer_centers/index.html Accessed 3/20/10

Conclusion:
I cannot emphasize enough the need for collaboration. The advocacy community, and entire research community, must embrace our common goal and support science and collaboration that will enhance the battle against cancer on all fronts. It is our responsibility to represent patient's needs, and what is needed to end the burden of all diseases.

We respectfully ask that the members of this committee, the Congress and the Administration, be steadfast in their commitment to ending cancer, through not only sustained funding research but supporting and facilitating inter-agency collaboration, regulatory science, tearing down the silos, and encouraging the development of public-private partnerships.

Mr. PALLONE. Thank you, Dr. Allen. I thank all of you, really. I want to particularly mention Ms. Fitzgerald. I remember when your husband passed away last year and how sad it was and a difficult time for Mr. Shimkus in particular, and I just wanted to thank you for sharing Ray's and your family's story with us today. Thank you.

I am going to recognize myself first. You know, I wanted to ask, I guess, Ms. Fitzgerald and Ms. Don, you know, you both described progress in our fight against cancer but that it has been limited progress with certain types of deadly cancers like pancreatic, stomach and esophageal cancer, and of course, I mentioned my mother, and one of the things that—I will try to be brief, but what happened was, I started doing research and I actually went on your Pancreatic Cancer Action Network site almost daily during that period of maybe 7 or 8 months from when she was diagnosed to when she passed away, and of course, the one thing that I kept finding out was that the problem was no early diagnosis. In other words, by the time you find out about pancreatic cancer, it is usually too late. In her case, though, there was a little bit of an early diagnosis because she had jaundice, and I basically found out from your Web site that that is one of the few cases where they do find it a little early if the person gets jaundice and that is because the tumor presses on something, I guess the bile ducts or whatever, and the person turns yellow, which is what happened to her, and then she did have an opportunity. They call it the Whipple operation. And I have talked to a lot of people, even Members of Congress, who had the operation.

But what I wanted to ask you is, is that one of the reasons, and if not, what are the reasons why pancreatic cancer or a lot of these other deadly cancers are so challenging to researchers? Is the lack of an early diagnosis the main problem or what is it from a research perspective?

Ms. DON. It is actually twofold. One is the fact that we don't have early detection tools and the second is that pancreatic cancer in particular is a particularly difficult disease to diagnose. The pancreas is located deep in your body so it is not something that a doctor can feel on examination. As you mentioned, there really aren't that many early warning signs. It is usually lower back pain or jaundice, and typically with jaundice, the tumor is pushing on the bile duct and typically that is too late. So if your mother was a candidate for the Whipple surgery, then that was actually fantastic news because most patients are not. Only 15 percent of pancreatic cancer patients are currently eligible for the Whipple procedure, which is a very, very difficult surgical procedure where they take out almost all of your digestive tract to get to your pancreas. So if only 15 percent of patients are eligible for the surgery, then that means that another problem is that it is very difficult to get tissue because you only get issue when you do surgery.

Mr. PALLONE. Oh, you are saying because only 15 percent actually have the surgery, you just don't get much tissue to work with?

Ms. DON. Right.

Mr. PALLONE. Of course, most of those don't last more than a year or two anyway, even when they have the Whipple, but I see your point.

Ms. DON. Pancreatic cancer also has a very high recurrence rate. Of the people who have surgery, 80 percent will have a recurrence within 5 years.

Mr. PALLONE. Right. That is what they tell us. So now, is this lack of early warning the biggest problem not only with pancreatic but also with a lot of these other deadly cancers or that is just pancreatic?

Ms. DON. No, it is——

Mr. PALLONE. And Ms. Fitzgerald can chime in too if she wants.

Ms. DON. It is a similar problem across many of the cancers, and most of the deadly cancers we find at very late stages, so getting the cancers at earlier stages would be helpful but we also don't have treatments for them once we get them. As I mentioned, the best treatment for pancreatic cancer is a surgical procedure that even in the best case, 80 percent, still don't make it more than 5 years.

Mr. PALLONE. Ms. Fitzgerald.

Ms. FITZGERALD. I think it is a combination. There are very few symptoms in many of the GI-tract cancers, gastric cancer. You know, like I mentioned, my husband's symptom was burping which is, you know, pretty often reflux or something of the kind——

Mr. SHIMKUS. Ray did that all the time.

Ms. FITZGERALD. But there are few symptoms, and I think it is also in the case of gastric cancer, a rapid progression. So you have very few symptoms, you have a rapid progression throughout the GI tract and then straight—because the stomach pumps out all your—you know, it gets your food and it pumps out your nutrients. It goes straight to your blood so it goes straight to your liver, so it is a rapid progression and right to basically all of your blood and so it goes throughout your body, and I think that is really similar on a number of the GI cancers, that they progress right to the liver.

Mr. PALLONE. So is the problem then—in other words, is the reason why National Cancer Institute or others don't do a lot of research because they just figure that with all these problems and the difficulty of determining early diagnosis and cures, it is just not worth the investment? I don't want to put it that way but is that what is going on? They would rather spend money on other things where they think they can make more progress? Is that what we are getting?

Ms. DON. I think that from our perspective, and obviously I can't speak for NCI but from our perspective, it has been a case of we have gotten to a point where we encourage researchers to go after the lowest hanging fruit, and NCI funds the safe bets.

Mr. PALLONE. Because this way they can show they are spending money, they want to show results.

Ms. DON. That, and there is a limited amount of money.

Mr. PALLONE. But in a sense, I mean, at one level it makes sense because then they can show they have results. On the other level, they may be spending money on things that aren't as deadly and don't need—I mean, you see my point. In other words, why not spend money on the areas where we have such problems rather than the ones where we don't.

Ms. DON. And that is our central point, that we really believe the time has come where we have to challenge NCI to tackle the hard-

est problems, and the hardest problems are really the deadly cancers where we have made the least amount of progress. That doesn't mean there is not worthwhile research to be done on other cancers, on breast cancer and colon cancer and prostate and the others, but there is definitely a set of cancers that have not gotten the same amount of attention or really any sufficient attention, and it is time to focus efforts there.

Mr. PALLONE. Thank you.

Mr. Shimkus.

Mr. SHIMKUS. Thank you. And I want to thank Dr. Barker for staying here and listening to the testimony. That doesn't always happen here in Congressional hearings, and I think it is to your credit. And I also now can see why the funding issue that we struggle with is very similar to the funding struggles that you have.

Ms. Don, kind of on the same line, but the question would be, NCI's efforts towards establishing The Cancer Genome Atlas, which was discussed at length, I think, how is that going to help research towards the deadly cancers, the pancreatic and gastrointestinal and others?

Ms. DON. Well, we certainly appreciate and want to acknowledge Dr. Barker in particular for all of her work to try and ensure that deadly cancers are included. I mean, the three places where they started were three of the deadly cancers, and she has absolutely reached out to the deadly cancer community to try and get more deadly cancers included. I think the issue is that The Cancer Genome Atlas is one piece of a very large puzzle of things that we need to be doing for these cancers. It is a very important piece, as is nanotechnology, but we also need to be doing additional things to be able to understand the bigger picture and so we fully support TCGA moving forward, and from the Pancreatic Cancer Action Network's perspective, we absolutely hope pancreatic cancer is included and we can figure out a way to deal with the tissue issue with pancreatic cancer, but we need to focus on other efforts too.

Mr. SHIMKUS. Great. Thank you.

Kristin, again, welcome. We all miss Ray. And your daughters have been precious in the back. Let me ask you a question on the issue of federally coordinated national cooperation. Why is that so important in cases like stomach cancer that develop in young people?

Ms. FITZGERALD. First, I just want to publicly thank you and your staff for your tireless advocacy on behalf of Ray, and I know that he would be incredibly happy that we were here at the Commerce Committee, his favorite committee, and this is a Congressional family. Ray's family was Congressional, many of whom are here, and I just want to thank you for helping and I know that it would mean a lot to him that we are helping to prevent this from happening to other people.

I think that I would say that NCI federally coordinating cooperation and collaboration on the case of GI cancers like gastric cancer and esophageal cancer is one of what I would think would be their truest missions, which in the case of someone like Ray where they are younger and they have a more rare cancer, that is a time where there really isn't a sample size that you need at any one institution. There are many institutions that are doing their best to

really make a difference in curing people that have gastric cancer but they might see a handful of patients that are young like Ray, so in really attacking that question of what is happening in these cases with gastric and esophageal cancers that are happening in young people, collaboration is absolutely essential. Otherwise they just won't be able to make the kind of gains that they need. And they need—in the case of gastric cancer, they need a place to store tissue. They don't have a biorepository where they can store things. They need to be able to share that so they can make the research happening at any one institution benefit from the kinds of tissues that are coming into other institutions. They need a clinical registry which is coordinated on a federal level, all the kind of things that they can use to determine the kinds of influences that are contributing to these cancers. The coordination on a federal level helps to be able to solve that problem because of the smaller sample size at all the institutions that are working so hard.

And probably most importantly, they need a coordinated federal research project because there are difficulties in obtaining gastric cancer tumors. When you are diagnosed with gastric cancer, you can't have surgery if you are stage IV like Ray because that would delay your chemotherapy and you would probably die. So you have to have mechanisms in order to develop a better tissue sample before it is treated with chemotherapy, and those are the kinds of things that NCI can perfect and disseminate throughout the United States because you are not having an endoscopy at a cancer center most likely. You don't think you are going to find cancer. And so even the community centers need to be able to get a sample size of the tissue that is untreated in order to have the kinds of things they need to make the truest gains in research. So it is probably in my view one of the areas where NCI can most be effective is coordinating all these fantastic cancer centers that are doing their very best in these areas and really making those gains.

Mr. SHIMKUS. Thank you, and I have got limited time, but the 5-year survival rate for GI cancer is?

Ms. FITZGERALD. Well, for metastatic cancer, five of the worst survival rates, and I put them in my testimony, are GI. I think it is 1.7 for pancreatic. Liver is, I think, 2.2, 2.4 for esophageal, 3.4 for GI cancer. So, you know, folks with metastatic cancer, which is where it is often found for those GI cancers, they are not living.

Mr. SHIMKUS. Which is compared to some of the others where we have 95 percent early diagnosis, and I know they are different, but that is part of this debate.

My time is up but I just want to, if I can, Mr. Chairman, just go to Dr. DiPaola and Dr. Allen. Because we have had a big debate on this terminology and hopefully this terminology is maybe not the same, or I am trying to get—comparative effectiveness research, which in the health care debate we talk about funding. Comparative effectiveness research, I hope, I gather from what you are doing, is finding the right response for the right disease, kind of like Dr. Barker talked about on the genome and the right medicine or whatever to affect that. What is your definition of comparative effectiveness research? Is it for directed research or is it not for a funding process, is it?

Dr. DIPAOLA. It is a great question, and this comes up a lot. In terms of comparative effectiveness research, what we are really trying to do is do research to try to understand with many of the therapies that we have how to have better outcomes for patients, so how to take the therapies that we do have and appropriately use them to maximize their effect and outcomes for patients.

Mr. SHIMKUS. Not possibly minimize care based upon the cost?

Dr. DIPAOLA. I think that it should be focused on outcomes.

Mr. SHIMKUS. Dr. Allen.

Mr. ALLEN. Thank you. At Friends of Cancer Research, we spend a lot of time looking at this issue for really about the last 2 years, and in conjunction with the cancer community put together a policy white paper that I am happy to leave copies for the members of the committee if you are interested. But what this outlined was really from a broad perspective what can be obtained through comparative effectiveness research, largely focusing on the need for creating additional information, and I think we are in a fortunate position as far as the national infrastructure that is available in this country from the cancer research centers funded by NCI to be able to collaborate better to create additional information that then can be a starting point for comparative effectiveness research but it is important as this funding is being allocated to fund comparative effectiveness research moving forward that we capitalize on the strengths of the different agencies to be able to really get to the answers to the questions that we are looking for and so comparative effectiveness and personalized medicine can actually go hand and hand and inform each other better.

Mr. SHIMKUS. Thank you, Mr. Chairman.

Mr. PALLONE. Thank you.

Next is our vice chair, Ms. Capps.

Mrs. CAPPS. Thank you. Thank you, each of you, for your testimony. I had to miss some of the oral testimony but I am glad I could read the written statements that you made and I appreciate it very much. I have two questions, one to ask you, Dr. DiPaola, quite specific to the Cancer Institute of New Jersey. Then I have a more generic question to ask each of you.

So if I could ask you, Dr. DiPaola, your testimony described the work of the Cancer Institute and the work of the consortia. Can you just briefly highlight the issues involved in setting this up and the way this could be replicated in other areas of the country, how it could be streamlined perhaps as a model?

Dr. DIPAOLA. Sure, absolutely, and I think that the consortia model is being done throughout the country, you know, and I gave an example in terms of what we are doing. CINJ as an NCI-designated center does have a consortia model, meaning there can be members, great researchers from additional institutions, especially local institutions, that would basically allow us to share their science, work together and translate that science into clinical trials for patients. Right now we work together with many of the researchers at Rutgers and now even Princeton, and what I had described in my testimony was an example of that that has actually led to a better understanding on how to better starve tumor cells and has led to additional grant funding because of this team approach. Additionally, it has led to clinical trials that are operating

right now that are taking that biology and that understanding from researchers from multiple institutions and putting it into designing new clinical trials.

Mrs. CAPPS. Thank you, and because of Dr. Barker's previous testimony, I can see the connection with NCI and then to you and then perhaps other consortia around the country too. I see a really good model.

Finally, I know that it has been mentioned already that our recovery dollars have been a real boost to the NCI. The downside of that is that it is one-time or limited-time funding. I would like each of you to respond to this question. We all know that NIH has essentially been flat-funded during a good portion of the past decade. In your experiences, how has this affected cancer research, and particularly research on the deadly cancers, and briefly, how can we avoid that in the future? Just down the panel, if you will start, Ms. Fitzgerald.

Ms. FITZGERALD. I think that NIH and NCI are doing their very best.

Mrs. CAPPS. I know they are.

Ms. FITZGERALD. It is a difficult balance. I think one of the things that I would like to see is factoring in incidence but then factoring in mortality. You know, maybe there is a large portion of the United States that gets a particular cancer but if they have treatments, they are a little bit better off than, for example, my husband, who there just wasn't treatment available and so factoring in that, when you get this cancer, then you die, that to me should mean that there is a priority there in the federal research. So to the extent that new dollars come into the pot, that those are—and even with the existing dollars, they are apportioned in a way that includes looking at those kinds of statistics.

Mrs. CAPPS. Thank you.

Ms. Don.

Ms. DON. So 2 percent of NCI's $5 billion budget goes to pancreatic cancer research. When you talk about ARRA funds, there are approximately 208 projects for all of the eight deadly cancers for a total of about 5.7 percent of NCI's ARRA budget. So we look at it, if these eight cancers are causing half of all cancer deaths, we are not trying to say that it should be X percentage or X number of dollars that should go to these cancers but it seems like there should be more than 18 percent of the overall budget, 2 percent in the case of pancreatic, less than 6 percent of ARRA funds going to the cancers where we have the worst survival rates, and as I stated earlier, I think that part of the problem is that given the flat funding, NCI has been looking for the safest bets instead of the most difficult research and the deadly cancers clearly are some of the most difficult and complex research.

Mrs. CAPPS. Let me shift the tone for you, Dr. DiPaola, given your testimony. Is there a way that the consortia could come partway to meet that diagnosis that has been given by the two previous, you know, how can the deadly cancers that need so much, is there a way that what you do can help meet the needs that they propose?

Dr. DIPAOLA. Yes, I do think so. You know, as we especially work in teams, you know, teams of researchers that are really discov-

ering new pathways and the biology and align them with the clinical researchers that are able to take it in the clinic or for clinical trials that are therapeutic or for new biomarkers that might be useful in diagnosis. I think as we support those teams coming together on a regular basis, we speed up that process so that that biology, which is cancer biology, can apply towards really any cancers, and especially rarer cancers. I can tell you that I spent this morning being part of a session at NCI, a symposium where we looked at a new biology focused on that area of metabolism actually called autophagy, and what was commented in the symposium was that that biology actually applies even best to the most aggressive cancers, so now what would be important, which we did there, was we had laboratory researchers presenting with clinical researchers is translate that to many different cancers but it is that same important biology.

Mrs. CAPPS. That is important.

Dr. Allen.

Mr. ALLEN. Thank you. Well, I think like any situation where there is a budget, there comes hard choices. But I think that with NCI leading the way, it must be encouraged to look at what other components of the health care system can provide data so that cancer research is an ongoing and learning process. We need to look at the data that is available through other federal health-related agencies, and even as Ms. Fitzgerald mentioned earlier, with so many cancer patients being treated in a community setting, how cancer treatment can actually be research so that we learn more about the products we are even using now, because when they come to market, we don't really fully understand, particularly the impact that these products might have in different populations that weren't involved in the original clinical trials. So there is a degree of creativity in trying to capitalize and generate as much data as possible so that we are in a learning process continuously.

Mrs. CAPPS. Thank you, each of you.

Mr. PALLONE. The gentleman from Texas, Mr. Burgess.

Mr. BURGESS. Thank you, Mr. Chairman. You know, I think it is interesting on a historical note, this building that we are in, the Rayburn Building, Mr. Rayburn did die of pancreatic cancer and the diagnosis was just as Ms. Don described it. He came down with back pain, came back to Texas, was hospitalized probably back then under the care of an orthopedist for a while without much help to his problem, and ultimately succumbed to his disease. So I don't think things were a whole lot different in 1961 than they are in 2010. It is useful to reflect.

Dr. Allen, I just wanted to ask you on the issue that has come up of course with The Cancer Genome Atlas and the issue of personalized medicine as far as treatment but what about prospectively? What about looking ahead at someone's risk? What if there were a way to screen people to understand where their risks were? Is that something that is on the horizon out there from a genetic standpoint, not just from the family history, not just from the things we typically associate but you have companies out there now sequencing human genomes for $987. Is that a useful part of what lies ahead for the next generation of researchers and doctors?

Mr. ALLEN. I think it is quite possible. The challenge is that right now at this point in time we may not fully understand what some of that information could lead to down the road or what it actually means at a point in time or quite frankly what to do in order to act and when a problem is identified. But I think this also goes back to the earlier question about how we try and gather long-term longitudinal data so that we understand the outcomes associated with some of those genetic tests that are detected. Ms. Castor described really a large project that is going on at the Moffitt Cancer Center that is trying to do just that. As patients come in and are diagnosed with cancer, they are enrolled in a long-term database that allows for a great deal of follow-up. So not everyone can be enrolled in a clinical trial throughout their lifetime but if there is a way that we can try and capture more data about each individual person, share this across multiple centers and agencies, then we may be able to get to some of these longer-term answers much quicker.

Mr. BURGESS. Where are you in that process? My father trained at Mayo Clinic back in the late 1940s. Part of his master's thesis was on esophageal cancer. Mayo Clinic has tissue from every patient they have ever seen since patient number one. Is there an effort to sort of consolidate and be collaborative of this mass of data that is out there?

Mr. ALLEN. I think there are some very good efforts underway. The challenge is the problem is so complex. One program that the NCI would be able to tell you more about is their cancer bioinformatics grid which looks to align clinical trial data from multiple centers across the country. This helps to essentially increase your patient base as well so hopefully like the others at the table mentioned, when you have smaller cancer populations enrolling for those trials is an increased challenge so kind of connecting the data between others is underway. I think the challenge is that the data sources are do disparate right now that it is very difficult to align what you gain from a clinical trial versus perhaps administrative records like CMS that have more of a longitudinal look to things rather than a point in time kind of where clinical trial is a little shorter span.

Mr. BURGESS. Well, with other areas in medicine, particularly with the push to electronic health records, we talk about particularly for hospital-acquired infections, for example, deidentifying and aggregating data so that trends can be spotted sooner than perhaps in the past. Is this type of work going on as far as surveillance of cancer? It seems like The Cancer Genome Atlas being developed, this would be something that people would want to do and in fact would be a priority.

Mr. ALLEN. Absolutely, and I think there is a great deal of interest in doing that. It is underway. It is expensive. But right now I think the biggest challenge, it is frequently done in isolated different centers so you mentioned the Mayo Clinic, which has a fantastic model and example and achieved many successes from it. But in order to really harness the power of this, it would be nice to try and adopt that and allow it to link in to other systems that are doing very much the same thing so that we increase the pool, so to speak, the means to the end will be much faster.

Mr. BURGESS. Dr. DiPaola, is that something that you are doing in New Jersey?

Dr. DIPAOLA. Absolutely. In fact, you know, one of the areas that we have increased dramatically over the last follow-up years was our bioinformatics area, and they are working with NCI in their efforts so that we do a better job in having clinical data associated with all of the issue and genetic data.

Mr. BURGESS. What about the concept Ms. Fitzgerald raised? A lot of, particularly, well, in this case not early stage gastric cancer is diagnosed at an endoscopy center or an ambulatory surgery center, kind of different from the days when I trained, whoever was in the hospital, and it was not as big a challenge to collect tissue and get it down to the lab. Is there an effort being made to get collaboration from the endoscopy centers and ambulatory surgery centers for just this type of data collection?

Dr. DIPAOLA. There is. You just pointed out some of the things and challenges we need to overcome, and especially when things are in these trials including multidisciplinary approach, not only multidisciplines in terms of lab and clinical researchers but different disciplines in terms of surgery and radiation oncology and medical oncology.

Mr. BURGESS. But it does seem, Ms. Fitzgerald was telling her story and we have the other paper where it talks about the incidence of adenocarcinoma of the esophagus increasing. I mean, I have heard that story different names and different places but the same story, advanced-stage esophageal cancer being diagnosed at an ambulatory surgery center or endoscopy center if the incidence is indeed increasing, and this is not—I mean, this is the third time I have this story told. I did practice medicine but not GI. It just seems like that is something we should be perhaps a little bit more aggressive about, about getting the word out to our clinicians who are doing the endoscopies out in the field.

Ms. FITZGERALD. I don't think that the technology exists to get the kind of tumor sample that they want, right now, anyways. I mean, I think that it is important to get that little biopsy but what they really need is they need that whole tumor with those properties before it is treated and so they need, like, a little hole punch that goes all the way down and gets more of those tumor properties, and I think NCI is working on that but I am not sure that it is totally the kinds of tissue that we need for the kind of research that we need to do. I am not sure that that technology is totally available.

Mr. BURGESS. But, I mean, 15 years ago we were doing that for breast disease for estrogen receptors in the hospital. They weren't large tissue samples with ovarian malignancy.

Ms. FITZGERALD. And they haven't been disseminated, and I think the other part of it too is that in terms of clinical trials, many patients do not qualify for clinical trials because they are late-stage diagnosis. For example, my husband could not qualify for that so I think clinical trials are really important in terms of driving some of the funding but I think in the case of pancreatic cancer and some of these other cancers like gastric cancer, you simply are not going to be able to participate because you don't qualify and so

there has to be a way of obtaining those kinds of tissue samples too.

Mr. PALLONE. OK. We are 3 minutes now.

Mr. BURGESS. Sorry.

Mr. PALLONE. That is all right.

The gentlewoman from Illinois, Ms. Schakowsky.

Ms. SCHAKOWSKY. Well, first of all, let me just express my condolences to you, Ms. Fitzgerald. As has been said, there is really not a family that hasn't been affected. My 38-year-old daughter-in-law died of cancer 5 years ago. I admire your incredible composure. I am still not as good at talking about it as you were today. You are great.

Here is what I want to really understand from this testimony. One is the issue just of diagnosis. If there is not really major symptoms of some of these deadly diseases, then inevitably when they are diagnosed, they have moved along. So maybe this has all been said in the testimony but it is not just what we do about the cure. Yet your husband was burping. I mean, who doesn't, right? So what would drive—let us say he went for an annual checkup. What do we do about diagnosis?

Ms. FITZGERALD. You have to have a molecular screen on a cellular level. You have to have a blood test that could pick him up because there is no other way that you can prevent it because there is not a large enough population for these cancers that they will ever have the invasive screening procedures necessary that there would be for like colon or breast cancer. You just won't have an endoscopy screening program in the United States like you have a mammography or a colonoscopy program.

Ms. SCHAKOWSKY. Right.

Ms. FITZGERALD. You have to have that science. You have to understand that molecular change that somebody on their regular visit to their general practitioner has a blood draw and catches that and either gets put into a screening program or, you know, catches the cancer and takes it out. You know, that is the only thing that would be able to get somebody in this kind of a situation.

Ms. DON. If I may comment, that is absolutely true. The other thing is that we do need more awareness for the symptoms that we know about. For example, in pancreatic cancer, we are beginning to see that there may be some evidence that otherwise healthy mean who all of a sudden have diabetes may actually have pancreatic cancer, and when they see their general practitioner their general practitioner isn't thinking about pancreatic cancer, they are thinking about treating their diabetes, and so we need to get more information out there about even back pain. We need to get more information out there so that more physicians are thinking about some of these other cancers from very seemingly benign symptoms and we absolutely need a good early detection test but we also need to get information out as it becomes available.

Ms. SCHAKOWSKY. Thank you.

Dr. DiPaola.

Dr. DIPAOLA. I absolutely agree with the other speakers. I guess what I would say is that, you know, with the research that is going on looking at the biology of the cancer that leads to an under-

standing of what potential markers we could assess, which might be early diagnostic markers.

Ms. SCHAKOWSKY. Meaning when we take a blood sample or something?

Dr. DIPAOLA. I think that we need to continue to work toward discovery of even better markers as we learn the biology of cancer even more, and the problem is that once we understand that in the laboratory to really apply it in the clinic. We need to conduct very large clinical trials to validate that, and that becomes difficult, especially in rarer tumors, and I think having partnerships and collaborations to conduct those types of trials is going to be critically important. So even if we found and there are a number of potential markers to prove it and make sure that it is doing what it should be doing, we need these larger clinical trials.

Ms. SCHAKOWSKY. So if cancer were present but it is not one of these common ones, is our goal to develop now some kind of a simple one-size-fits-all diagnostic tool that is a blood test of some sort or, I don't know, urine, whatever, I don't know, that would at least say there is some abnormality that is worth looking at?

Dr. DIPAOLA. Well, I mean, the goal would always be to define the best and the simplest. I think——

Ms. SCHAKOWSKY. But are we looking for that? Are we anywhere close to that?

Dr. DIPAOLA. Absolutely. I mean, I think there are a lot of leads and it stems from understanding the biology better. I do think that kind of the partnership between the labs that are looking at the biology and these potential markers with the clinic need to continue to work together, but it will ultimately require validation in these larger clinical trials where many people need to be enrolled to really understand this.

Ms. SCHAKOWSKY. But is the thought, though, that some manifestation of the disease is more likely to show up? You seem to imply that even then in some of the rarer forms of cancer that it may not necessarily show up in some kind of a mass test.

Dr. DIPAOLA. No, I think that there is a lot of potential based on the biology and understanding new markers. There are new imaging modalities that are coming up all the time, so our ability to do things with greater technology have a lot of hope and I think our ability to collaborate so that we can conduct larger trials to prove or disprove and develop these different technologies is going to be important but I do think we need to look further, some relying on, as you have heard, the current symptoms and current imaging modalities for many of these cancers is just not enough and so we are relying on new science and discoveries, new markers and developing them all the way through clinical trials to prove them and use them in the best possible way.

Ms. SCHAKOWSKY. Thank you. Thank you all.

Mr. PALLONE. Thank you.

Mr. SHIMKUS. Before you could, could I——

Mr. PALLONE. I yield to the gentleman.

Mr. SHIMKUS. Thank you, and I will be brief. Kind of following up on my colleague from Illinois's comments, I think part of that genome discussion I think earlier, one of my takeaways is that if we identify in essence an individual genome, and I would have

thought that they would never change. Obviously there are changes that may occur, and then if people have that as part of their medical record, then you may get a better heads-up than before. Is that fair to say?

Dr. DIPAOLA. Absolutely. If you can start identifying populations that are at risk for certain cancers, then as you develop even, you know, the existing and the newer modalities whether they be imaging or new biomarker potential diagnostic tests, you would apply them more individualized and appropriate, especially for the higher populations.

Mr. SHIMKUS. And I guess the other takeaway is that we do—as we know, we always have the disease groups here. This funding issue causes people to struggle, and it is very compelling when you talk about mortality rates and where should dollars go. Now, we would hope that NCI would take that into consideration as they make these decisions versus intervention by us or other people. I was never one to want to direct funding because you want it to go to the scientists and you want them to apportion based upon due diligence, but there is a question about should mortality be given a higher priority, and that is kind of a takeaway and I don't know what we do from that.

And last, I got an e-mail. Kristin, folks who are watching, they are saying you are doing a great job and they appreciate your strength and fortitude.

Thank you, Mr. Chairman.

Mr. PALLONE. Thank you.

Let me say before we conclude, it is very obvious to me and I am sure to everyone in the room that there is a great deal of interest on this panel in everything you have discussed, and I know it was mentioned that Ms. Capps and I are trying to put together some legislation and there is already, I think that you mentioned the pancreatic cancer bill that is already out there. I mean, there are different things out there. So first of all, I will say we are probably going to have a lot of follow-up written questions to all of you just because we have so many questions. I know, for example, you both described the need for improved collaboration to ensure that scientific advances at NCI and others actually translate to safe and effective treatments, and I want to follow up with my staff about the three types of collaboration you discussed within the biomedical research community and with industry partners, so that is one thing I know we are going to get back to you on. But I am sure there are going to be others. So thank you so much. We really appreciate it. Usually we get back to you within 10 days or so with any written questions that we have, and I really appreciate your testimony.

And without objection, the Subcommittee hearing is adjourned.

[Whereupon, at 5:50 p.m., the Subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

Opening Statement for Energy and Commerce
Health Subcommittee Hearing
"NCI Cancer Research: Today's Progress;
Tomorrow's Challenges."
Congressman Marsha Blackburn
March 10, 2010

I would like to thank the Chairman for calling this hearing to inform this Committee of the progress the National Cancer Institute (NCI) is making in cancer research and discuss the issues that lay ahead.

I am excited about the cancer research that is taking place in my home state of Tennessee. The Vanderbilt-Ingram Cancer Center in Nashville is the only National Cancer Institute-designated Comprehensive Cancer Center in Tennessee that conducts basic, translational and clinical research and offers adult and pediatric oncology treatment. It is the only center in Tennessee consistently ranked among the best hospitals for cancer care by *U.S. News & World Report.*

The Cancer Research Institute of West Tennessee (CRIWT) aims to address two areas of cancer care that are often overlooked: *Individualized* Cancer Management and Treatment Therapy. The Institute is currently raising about $15,000,000 for research in early detection and treatment. CRIWT's research is unique in that it develops diagnostic, prognostic, monitoring and treatment protocols for cancer patients on an individual basis. Customized protocols may

be developed using these procedures to more accurately diagnosis a patient's tumor and prescribe the proper treatment.

St. Jude Children's Research Hospital is the only pediatric research hospital supported by a National Cancer Institute Cancer Center Grant. It is also the only *pediatric* research hospital to be designated a Comprehensive Cancer Center by NCI. It is the only pediatric cancer research hospital that produces highly specialized medicines for cancer treatment through a Good Manufacturing Practices facility. The University of Tennessee Cancer Institute is the adult cancer partner of St. Jude in Memphis.

Additionally, the Tennessee Breast Cancer Coalition provides assistance to more men and women than any other breast cancer grassroots organization in the state, and the Minnie Pearl Cancer Foundation offers free diagnostic mammograms and ultrasounds for uninsured and underinsured individuals in need of testing for their breast cancer symptoms.

While these organizations have provided significant advances in fighting many types of cancer, there is still much more work to be done. I look forward to hearing the testimony today and learning more about the innovative work being done by NCI.

Thank you, Mr. Chairman, and I yield back my time.

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March 19, 2010

The Honorable Frank Pallone, Jr.
Chairman
Subcommittee on Health of the Energy and Commerce Committee
2125 Rayburn House Office Building
Washington, D.C. 20515

The Honorable Nathan Deal
Ranking Member
Subcommittee on Health of the Energy and Commerce Committee
2125 Rayburn House Office Building
Washington, D.C. 20515

Dear Mr. Chairman and Ranking Member,

The attached statement is submitted for your consideration for inclusion in the record of the March 23, 2010 hearing entitled "National Cancer Institute's Cancer Research: Today's Progress; Tomorrow's Challenges."

Sincerely,

Laurie Fenton-Ambrose
President and CEO
Lung Cancer Alliance

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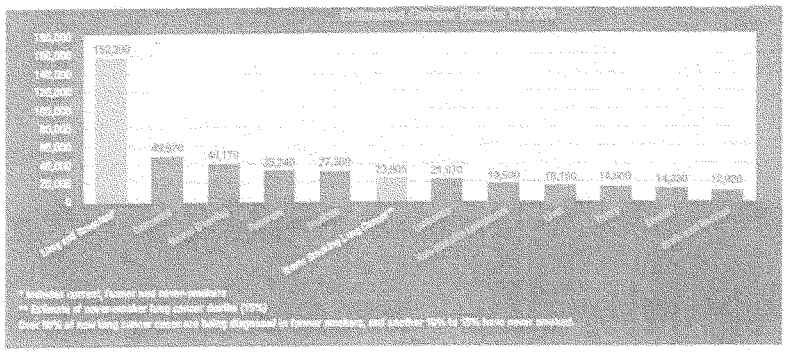
STATEMENT OF LUNG CANCER ALLIANCE
March 23, 2010
Subcommittee on Health
Hearing on NCI Cancer Research

Mr. Chairman and Members of the Subcommittee:

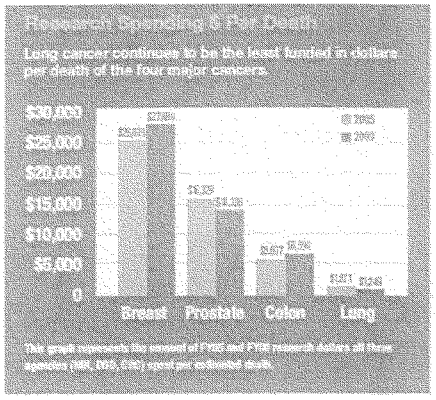
My name if Laurie Fenton-Ambrose and I am the President and CEO of Lung Cancer Alliance (LCA). LCA is the only national organization dedicated solely to advocacy and patient support services for those with lung cancer, their families and caregivers, and for those at risk for the disease. I appreciate this opportunity to enter this statement for the record of this hearing and we thank you and your committee for holding this important hearing on NCI Cancer Research.

As a founding member of the Deadly Cancer Coalition, LCA fully endorses the testimony of Megan Gordon Don, of Pancreatic Cancer Action Network, on the need for a targeted effort to focus on the greatest challenges with the greatest need: the high mortality cancers.



No other cancer causes more deaths each year than lung cancer: three out of every ten cancer deaths - more than breast, prostate and colon cancers combined. In 1971 when Congress passed the National Cancer Act, the 5-year survival rate for lung cancer was 13%. Today it is 15%. It is the most lethal cancer in every ethnic group and disproportionately higher in African American males and veterans.

In 2001, the Progress Review Group report to NCI on lung cancer concluded that lung cancer research was being funded "far below the levels that characterize other common malignancies and far out of proportion to its massive public health impact." This has not changed.



In recent reports published in the Journal of NCI on the cost of cancer care under Medicare, the productivity costs of cancer, and the estimates and projections of the value of life lost from cancer death, lung cancer tops every chart (see attached).

In FY10, with the support of this committee, funding for NCI was increased by 2.7% to $5.15 billion. According to NCI's figures, 3% was allotted for lung cancer research. Under the American Recovery and Reinvestment Act of 2009 (ARRA) NCI received over one billion dollars of unprecedented additional funding of which only 0.6% was earmarked for lung cancer research.

Not only has funding been limited, there has never been a comprehensive plan to coordinate tobacco cessation programs, earlier detection and research. With over 50% of new lung cancer cases being diagnosed in former smokers, and an additional 15% in people who have never smoked, this epidemic of lung cancer can no longer be dismissed as a "behavioral" cancer that smoking cessation alone will eliminate. Lung cancer in people who never smoked is the sixth biggest cause of cancer deaths.

There can be no appreciable reduction in overall cancer mortality or overall cancer costs unless lung cancer mortality is reduced. To that end, Congresswoman Donna Christensen has introduced legislation (HR 2112) and a companion bill has also been introduced in the Senate (S.332).

We urge your committee to consider targeted programs for the most deadly cancers.

Estimates and Projections of Value of Life Lost From Cancer Deaths in the United States

K. Robin Yabroff, Cathy J. Bradley, Angela B. Mariotto, Martin L. Brown, Eric J. Feuer

J Natl Cancer Inst 2008;100:1755–1762

Table 1. Age-adjusted mortality rates (per 100 000) in the United States by sex and tumor site, 1995–2003*

	Mortality rate (per 100 000)	
Sex and tumor site	<65 years	≥65 years
Men		
Lung	21.9	440.5
Prostate	2.0	218.6
Colorectal	8.6	148.7
Pancreas	3.9	69.3
Leukemia	2.9	60.0
Lymphoma (non-Hodgkin)	3.8	57.5
Esophagus	3.0	40.6
Urinary bladder	1.1	51.7
Liver	2.9	34.9
Kidney	2.9	32.5
Gastric	1.9	35.4
Head and neck	3.5	28.1
Brain and ONS	3.2	21.7
Melanoma of the skin	1.8	16.2
Lymphoma (Hodgkin)	0.3	2.2
Testis	0.3	0.3
All cancers	66.6	1465.5
Women		
Lung	13.9	228.5
Breast	13.3	113.4
Colorectal	4.6	152.4
Pancreas	2.5	56.1
Ovary	3.7	44.8
Lymphoma (non-Hodgkin)	1.8	36.2
Leukemia	2.0	32.0
Corpus uteri	1.4	22.9
Brain and ONS	2.1	14.4
Gastric	1.0	17.6
Liver	1.0	17.2
Kidney	0.9	16.6
Cervix	2.0	7.1
Urinary bladder	0.4	15.4
Esophagus	0.5	10.4
Head and neck	0.8	9.7
Melanoma of the skin	0.9	7.6
Lymphoma (Hodgkin)	0.2	1.4
All cancers	60.2	883.7

* Rates are age adjusted to the 2000 US Standard Population (19 age groups: Census P25-1130).

Tumor sites are listed from highest to lowest sex-specific age-adjusted mortality rate. ONS = other neurologic sites.

Table 2. Person-years of life lost (PYLL) due to cancer deaths in the year 2000 by sex and tumor site*

	Men		Women	
Tumor site	<65 years	≥65 years	<65 years	≥65 years
Lung	610 855	635 090	488 915	576 102
Breast	—	—	526 508	267 759
Prostate	49 602	219 714	—	—
Colorectal	196 931	184 506	172 303	224 289
Pancreas	113 170	94 461	87 697	130 226
Ovary	—	—	140 152	109 060
Leukemia	118 613	74 898	97 195	70 818
Lymphoma (non-Hodgkin)	89 986	73 154	70 133	86 679
Esophagus	67 829	59 466	18 211	24 476
Urinary bladder	31 581	66 283	13 639	32 320
Liver	92 689	49 063	36 486	40 086
Kidney	66 986	44 248	35 383	39 315
Gastric	56 741	45 901	39 245	33 282
Head and neck	75 641	40 517	23 630	22 962
Brain and ONS	123 302	32 733	97 110	36 459
Cervix	—	—	85 979	17 692
Corpus uteri	—	—	50 992	84 855
Melanoma of the skin	59 723	24 334	39 860	17 343
Lymphoma (Hodgkin)	15 345	2991	12 575	3241
Testis	12 593	411	—	—
All cancers	2 148 725	1 885 620	2 331 853	2 094 256

* Tumor sites are listed from highest to lowest sex-specific age-adjusted mortality rate. — = not available or not applicable to this population; ONS = other neurologic sites. To estimate PYLL, the number of deaths for each tumor site was calculated from age- and sex-specific mortality rates and age- and sex-specific population projections. For each death, cohort life tables were used to compute the remaining life expectancy had the person not died from cancer.

Table 3. Value of life lost due to cancer deaths in the year 2000 by sex and tumor site in billions of dollars*

Tumor site	Men		Women	
	<65 years (billion $)	≥65 years (billion $)	<65 years (billion $)	≥65 years (billion $)
Lung	68.1	82.3	50.1	72.3
Breast			51.3	22.9
Prostate	5.5	29.5		
Colorectal	20.7	24.1	17.2	28.8
Pancreas	12.1	12.3	8.9	13.5
Ovary	—	—	13.9	13.8
Leukemia	10.7	9.8	8.4	9.1
Lymphoma (non-Hodgkin)	10.0	9.6	6.8	11.1
Esophagus	9.4	7.7	1.9	3.1
Urinary bladder	3.4	7.7	1.4	4.2
Liver	9.6	6.4	3.6	5.1
Kidney	7.2	5.8	3.4	4.6
Gastric	5.1	5.9	3.6	5.0
Head and neck	7.8	5.3	2.4	2.9
Brain and CNS	11.5	4.2	3.5	4.6
Cervix	—	—	3.2	2.2
Corpus uteri	—	—	5.2	3.9
Melanoma of the skin	5.0	3.2	3.9	2.2
Lymphoma (Hodgkin)	1.4	0.4	1.1	0.4
Testis	1.1	0.1	—	—
All cancers	222.4	245.8	227.9	264.5

* Tumor sites are listed from highest to lowest sex-specific age-adjusted mortality rate. — = not available or not applicable to this population. CNS = other neurologic sites. Value of life lost was estimated using a previously published value of 1 year of life ($150,000) applied to the person-years of life lost estimate for each tumor site. All value of life lost estimates were discounted by 3% annually and reported in real dollars.

Table 4. Value of life lost due to cancer deaths in the years 2000 and 2020 by tumor site in billions of dollars*

Tumor site	Value of life lost		
	2000 (billion $)	2020 (billion $)	% increase in value of life lost
Lung	270.8	433.4	60.1
Female breast	86.3	121.0	41.6
Prostate	34.8	58.4	67.6
Colorectal	90.9	140.1	54.3
Pancreas	49.9	77.9	56.2
Ovary	27.7	41.0	48.1
Leukemia	38.0	55.4	45.9
Lymphoma (non-Hodgkin)	37.4	58.5	51.0
Esophagus	32.0	34.9	58.6
Urinary bladder	16.7	26.7	60.2
Liver	24.6	37.2	51.4
Kidney	21.0	32.5	54.9
Gastric	20.8	31.6	51.8
Head and neck	18.4	28.7	56.2
Brain and CNS	28.9	40.5	40.1
Cervix	10.5	13.5	28.7
Corpus uteri	12.1	18.5	52.4
Melanoma of the skin	19.1	31.6	42.6
Lymphoma (Hodgkin)	3.2	4.3	31.0
Testis	1.2	1.3	13.6
All cancers	860.7	1472.5	83.3

* Tumor sites are listed from highest to lowest sex-specific age-adjusted mortality rate. CNS = other neurologic sites. Value of life lost was estimated using a previously published value of 1 year of life ($150,000) applied to the person-years of life lost estimate for each tumor site. All value of life lost estimates were discounted by 3% annually and reported in real dollars.

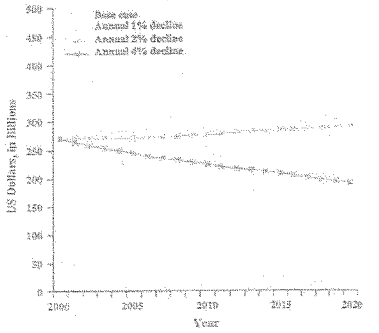


Figure 1. Projected value of life lost due to lung cancer deaths in the United States. The most recent years of data (ie, from 1998 to 2003) were used to calculate sex- and age-specific lung cancer mortality rates for the base case mortality rate projections. Sensitivity analysis scenarios included annual 1%, 2%, and 4% declines in lung cancer mortality.

Cost of Care for Elderly Cancer Patients in the United States

K. Robin Yabroff, Elizabeth B. Lamont, Angela Mariotto, Joan L. Warren, Marie Topor, Angela Meekins, Martin L. Brown

J Natl Cancer Inst 2008;100:630–641

Table 6. Aggregate 5-year costs of care for the cohort of elderly Medicare cancer patients diagnosed in 2004*

Tumor site	Women		Men		Total 5-year costs, million $
	No. of patients in United States	5-year costs, million $	No. of patients in United States	5-year costs, million $	
Brain and CNS	3223	141	3173	152	293
Female breast	77008	1375	0	0	1375
Cervix	2369	73	0	0	73
Colorectal	44838	1571	41798	1530	3101
Corpus uteri	15131	340	0	0	340
Esophagus	2382	104	5936	282	386
Gastric	5912	248	8512	376	624
Head and neck	5231	176	10338	317	492
Leukemia	7923	300	9712	335	635
Liver	2909	107	5042	171	278
Lung	54009	2038	61648	2200	4238
Lymphoma	16112	683	15403	667	1350
Melanoma of the skin	7981	53	14404	129	181
Ovary	9085	507	0	0	507
Pancreas	11755	429	9555	345	771
Prostate	0	0	119369	2294	2294
Renal	7750	278	11250	407	685
Urinary bladder	11304	256	31892	767	1023
All other tumor sites	38954	1113	46585	1304	2417
Total	334546	9771	392581	11353	21124

* All cost estimates discounted by 3% annually and reported in 2004 dollars. CNS = other nervous system. Data sources were 17-registry Surveillance, Epidemiology, and End Results (SEER) data (cancer incidence in 2004) and 10-registry SEER data (survival and SEER–Medicare (net costs by phase of care).

Productivity Costs of Cancer Mortality in the United States: 2000–2020

Cathy J. Bradley, K. Robin Yabroff, Bassam Dahman, Eric J. Feuer, Angela Mariotto, Martin L. Brown

J Natl Cancer Inst 2008;100:1763–1770

Table 2. Site-specific present value of lifetime earnings (PVLE) among adults 20 and older in 2010

Cancer site	PVLE, $US	Percentage of total cost	Deaths	PVLE/death, $US
Total (all cancers)	142 973 897 175	100.00	657 005	217 701
Lung and bronchus	38 803 478 028	27.36	185 202	210 430
Colon and rectum	12 902 283 437	8.99	67 923	189 962
Female breast	10 878 840 020	7.64	48 776	223 037
Pancreas	7 058 015 804	4.96	35 474	198 953
Leukemia	5 879 650 378	4.13	24 459	240 387
Brain and other nervous system	5 551 151 373	4.11	14 264	392 853
Non-Hodgkin lymphoma	5 765 042 320	4.04	26 230	219 407
Liver and intrahepatic bile duct	4 636 204 250	3.26	16 041	289 147
Ovary	2 944 956 275	2.07	16 700	176 347
Kidney and renal pelvis	3 632 633 377	2.55	14 246	254 993
Head and neck	3 530 331 776	2.55	12 100	299 803
Prostate	3 537 601 571	2.48	37 619	93 540
Stomach	3 453 516 837	2.43	14 774	233 768
Melanoma of the skin	3 298 014 331	2.32	8871	371 776
Urinary bladder	1 976 985 144	1.39	14 794	133 633
Cervix uteri	1 857 737 110	1.27	4896	387 440
Corpus and uterus	1 161 322 670	0.77	7595	139 479
Hodgkin lymphoma	828 897 766	0.58	1523	544 118
Testis	471 522 615	0.33	372	1 267 803
All other sites	23 873 706 259	16.77	104 231	229 048

Association of
American Cancer Institutes

Written Testimony to the
Subcommittee on Health
Committee on Energy and Commerce
United States House of Representatives

Supplement to March 23 hearing –
NCI Cancer Research: Today's Progress; Tomorrow's Challenges

Submitted April 6, 2010

Testimony submitted by:
Michael A. Caligiuri, MD
President, Association of American Cancer Institutes
Director, Ohio State University Comprehensive Cancer Center
CEO, James Cancer Hospital & Solove Research Institute

The Association of American Cancer Institutes (AACI), representing 95 of the nation's premier academic and free-standing cancer centers, appreciates the opportunity to submit this statement for consideration by the United States House of Representatives' Committee on Energy and Commerce, Subcommittee on Health.

AACI applauds recent budgetary commitments—notably, increased funding for NIH and support from the Obama Administration through the American Recovery and Reinvestment Act of 2009 (ARRA)--that have created a more encouraging landscape for cancer research compared to recent years. We hope that this support will continue in the years ahead, to ensure that this recognition of the importance of biomedical research is sustained.

AACI congratulates the administration and Congress on their commitment to ensuring quality care for cancer patients, as well as for providing researchers with the tools that they need to develop better cancer treatments and, ultimately, to cure this disease.

President Obama has released his FY2011 budget which includes a $1 billion increase to the National Institutes of Health (NIH) budget for an expansion of support for biomedical research. This funding boost would make the NIH budget $32.1 billion, representing a 3.2% increase. The National Cancer Institute (NCI) would receive an additional $161 million, or 3.16% more, for a total of $5.26 billion.

AACI has joined its colleagues in the biomedical research community in supporting the proposed increase for NIH and in calling on Congress to further strengthen the impact of the President's request by increasing funding to $35 billion.

With the extra NIH and NCI funding, the cancer community will be better equipped to leverage ARRA financial support. ARRA dollars have helped to sustain the momentum achieved in reducing death rates from cancer, and they are proving to be an effective means of stimulating local economies and creating or maintaining jobs throughout the country.

For example, my own institution, The Ohio State University Comprehensive Cancer Center – James Cancer Hospital & Solove Research Institute, and the Winthrop P. Rockefeller Cancer Institute at the University of Arkansas for Medical Sciences are moving forward with major construction projects supported by ARRA funding. Another AACI member, the University of New Mexico Cancer Center is buying equipment and hiring more staff with ARRA money, while a researcher at the Vanderbilt-Ingram Cancer Center, in Tennessee, is studying imaging techniques in colorectal cancer with help from ARRA grants (Association of American Cancer Institutes, *AACI Update*, February 2010).

Maintaining the flow of sufficient, dependable funding streams for NCI will help to continue the work that started under the stimulus plan. It will also serve as recognition that $70 million worth of great ideas--the approximate amount of ARRA funding for NCI to date--might not have been explored if it were not for the administration's unprecedented infusion of funds for cancer research. And much untapped scientific potential remains.

Cancer Research: Benefiting all Americans

Cancer's financial and personal impact on America is substantial and growing-- one in two men and one in three women will face cancer in their lifetimes, and cancer cost our nation more than $228 billion in 2008 (Centers for Disease Control and Preventions, *Addressing The Cancer Burden: At A Glance 2010*). This year, cancer will become the world's number one killer. Investing in cancer research is a prudent step - both for the health of our nation and for our nation's economic well-being.

Cancer research, conducted in academic laboratories across the country, saves money by reducing healthcare costs associated with the disease, enhances the United States' global competitiveness, and has a positive economic impact on localities that house a major research center. While these aspects of cancer research are important, what cannot be overstated is the impact cancer research has had on individuals' lives—lives that have been lengthened and even saved by virtue of discoveries made in cancer research laboratories at cancer centers across the United States.

Biomedical research has provided Americans with better cancer treatments, as well as enhanced cancer screening and prevention efforts. Some of the most exciting breakthroughs in current cancer research are those in the field of personalized medicine. In personalized medicine for cancer, not only is the disease itself considered when determining treatments, but so is the individual's unique genetic code. This combination allows physicians to better identify those at

risk for cancer, detect the disease, and treat the cancer in a targeted fashion that minimizes side effects and refines treatment in a way to provide the maximum benefit to the patient.

In the laboratory setting, multi-disciplinary teams of scientists are working together to understand the significance of the human genome in cancer. For instance, the Cancer Genetic Markers of Susceptibility initiative is comparing the DNA of men and women with breast or prostate cancer with that of men and women without the diseases to better understand the diseases. The Cancer Genome Atlas is in development as a comprehensive catalog of genetic changes that occur in cancer.

These projects—along with the work being performed by dedicated physicians and researchers at cancer centers across the United States every day—have the potential to radically change the way cancer, as a collection of diseases, affects the people who live with it every day. Every discovery contributes to a future without cancer as we know it today.

Clinical Trials

Clinical trials are the cornerstone of cancer research, and it is commonly held that "yesterday's clinical trials are today's standard therapies". Without clinical trials we cannot discover new cancer drugs and better treatments, and without volunteers we cannot conduct trials.

With no more than five percent of adult cancer patients participating in clinical trials, attracting volunteers to trials has been a long-standing struggle for cancer researchers. And yet, thanks in large part to advances realized through clinical trials, two-thirds of cancer patients now survive at least five years after diagnosis, compared with only half a generation ago.

Unfortunately, running a clinical trial from start to finish can be prohibitively complicated and expensive. While the nation's cancer centers represented by AACI work to untangle red tape and other factors that can derail trials, a serious obstacle stands largely beyond their control—the cost to patients of participating in trials.

Section 2709 of the Patient Protection and Affordable Care Act of 2010 requires health insurance plans, including those offered through the Federal Employee Health Benefit Program, to provide coverage for routine costs associated with participation in clinical trials.

Commercial health insurers often refuse to pay for routine care costs associated with a clinical trial, arguing that the trial is "investigational" and thus optional or unnecessary. Consequently, patients experience financial difficulties that limit their participation in trials. That, in turn, has a negative impact on research and patients' ability to receive promising treatments that are available through trials. It slows the development of new cancer therapies.

Routine costs associated with clinical trials include physician visits, blood work, hospital stays and x-rays. These costs would usually be reimbursed by the insurer if the patient was not participating in a clinical trial. The investigational portion of the trial (usually a new drug or device) is not charged to the patient or the insurer.

About 30 percent of the insured volunteers participating in trials at The Ohio State University Comprehensive Cancer Center experience such insurance claim denials of payment for routine care. Denials tend to occur with Medicare Advantage HMO and PPO plans and with insurance plans that are based outside the state where the trial is conducted.

Since 1994, 27 states and the District of Columbia have passed laws requiring insurance coverage for routine patient care costs when patients participate in clinical trials, and another five states have established cooperative agreements with insurers to do so. However, beyond the patchwork nature of such coverage, some of these laws do not necessarily require insurers to cover all cancer patients, such as those in Phase I or II clinical trials, or those with employer self-insured plans, in which a large company self-insures its employees. With the new federal policy, all cancer patients can now afford to enroll in a potentially life-saving clinical trial.

The Nation's Cancer Centers

The nexus of cancer research in the United States is the nation's network of cancer centers represented by AACI. These cancer centers conduct the highest-quality cancer research anywhere in the world and provide exceptional patient care. The nation's research institutions, which house AACI's member cancer centers, receive an estimated $3.15 billion from NCI to conduct cancer research; this represents 65 percent of NCI's total budget (U.S. Department of Health and Human Services, U.S. National Institutes of Health, *National Cancer Institute 2008 Fact Book*). In fact, 84 percent of NCI's budget supports research at nearly 650 universities, hospitals, cancer centers, and other institutions in all 50 states. Because these centers are networked nationally, opportunities for collaborations are many—assuring wise and non-duplicative investment of scarce federal dollars.

Collaboration between the cancer centers' and NCI is also essential, and extramural input in shaping NCI's programmatic priorities is vital for effecting cancer research breakthroughs. Furthermore, AACI endorses the call for greater collaboration expressed in recent testimony before this committee by Robert S. DiPaola, MD, director of the Cancer Institute of New Jersey. The association is in strong agreement with Dr. DiPaola that "culture of collaboration" needs to be nurtured among NCI-designated cancer centers, as well as between such centers and the pharmaceutical and biotechnology companies that develop drug treatment for cancer and related illnesses.

In addition to conducting basic, clinical, and population research, the cancer centers are largely responsible for training the cancer workforce that will practice in the United States in the years to come. Much of this training depends on federal dollars, via training grants and other funding from NCI. Sustained federal support will significantly enhance the centers' ability to continue to train the next generation of cancer specialists—both researchers and providers of cancer care.

By providing access to a wide array of expertise and programs specializing in prevention, diagnosis, and treatment of cancer, cancer centers play an important role in reducing the burden of cancer in their communities. The majority of the clinical trials of new interventions for cancer are carried out at the nation's network of cancer centers.

Ensuring the Future of Cancer Care and Research
Because of an aging population, an increasing number of cancer survivors require ongoing monitoring and care from oncologists, and new therapies that tend to be complex and often extend life.

Demand for oncology services is projected to increase 48 percent by 2020. However, the supply of oncologists expected to increase by only 20 percent and 54 percent of currently practicing oncologists will be of retirement age within that timeframe. Also, alarmingly, there has been essentially no growth over the past decade in the number of medical residents electing to train on a path toward oncology as a specialty (American Society of Clinical Oncology, *Forecasting the Supply of and Demand for Oncologists: A Report to the American Society of Clinical Oncology (ASCO) from the AAMC Center for Workforce Studies*, 2007).

Without immediate action, these predicted shortages will prove disastrous for the state of cancer care in the United States. The discrepancy between supply and demand for oncologists will amount to a shortage of 9.4 to 15.1 million visits, or a shortage of 2,550 to 4,080 oncologists. (American Cancer Society, *Cancer Facts and Figures 2008*).

Cancer physicians—while essential—are only one part of the oncology workforce that is in danger of being stretched to the breaking point. For example, the Health Resources and Services Administration has predicted that by 2020, over 1 million nursing positions will go unfilled. The Department of Health and Human Services projects that today's 10-percent vacancy rate in registered nursing positions will grow to 36 percent, representing more than 1 million unfilled jobs by 2020.

Greater federal support for training oncology physicians, nurses, and other professionals who treat cancer must be enacted to prevent a disaster where demand for oncology services far outstrips the system's ability to provide adequate care for all.

Conclusion
These are exciting times in science and, particularly, in cancer research. The AACI cancer center network is unrivaled in its pursuit of excellence, and places the highest priority on affording all Americans access to superior cancer care, including novel treatments and clinical trials. It is through the power of collaborative innovation that we will accelerate progress toward a future without cancer, and research funding through the NIH and NCI is essential to achieving our goals.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

National Institutes of Health
Bethesda, Maryland 20892

APR 29 2010

The Honorable Anna Eshoo
House of Representatives
Washington, D.C. 20515

Dear Ms. Eshoo:

Thank you for the opportunity to testify at the March 23, 2010 hearing entitled "NCI Cancer Research: Today's Progress; Tomorrow's Challenges" before the Committee on Energy and Commerce Subcommittee on Health.

I appreciate your interest in the research being conducted at the National Cancer Institute. The enclosed responses to your questions for the record provide additional information on our strategies for addressing the many challenges we face in cancer research.

Thank you again for your interest and support of cancer research at the NCI. Please do not hesitate to contact me for additional information.

Sincerely,

Anna D. Barker, Ph.D.
Deputy Director
National Cancer Institute

Enclosure

How does the National Cancer Institute strike a balance between the more global approach to cancer versus the immediate needs of deadly cancers, like pancreatic?

The NCI strives to maintain an overall portfolio that includes: (1) the best of the basic research that will yield data and scientific insights relevant to all cancers, and (2) significant investments in translational and clinical research to ensure that laboratory advances reach patients. Both are important to ensure that we continue to build a fundamental understanding of cancer, while ensuring that patients with cancer receive the best of what evidence based cancer medicine can deliver.

Cancer is an extraordinarily complex collection of over 200 diseases that share a number of common hallmarks. In the past decade, our understanding of the molecular basis of cancer has evolved rapidly to a point where highly lethal cancers such as pancreatic benefit directly or indirectly from most if not all of the research that comprise the NCI's overall portfolio. Specifically, the highly lethal cancers have become a major focus for, and beneficiary of, several NCI strategic initiatives such as The Cancer Genome Atlas (TCGA) and the Nanotechnology Alliance for Cancer.

Advances in technology now make it possible to obtain comprehensive genomic information from multiple tumor types to catalog most, if not all, of the genomic changes associated with a specific cancer. To capitalize on this unprecedented opportunity, the NCI and the National Human Genome Research Institute (NHGRI) undertook a 3 –year pilot program to determine the feasibility of developing an "atlas" of all of the relevant genomic changes in most cancer. After successfully completing the TCGA Pilot Program in 2009, TCGA was expanded to a five-year large scale, high throughput program that is designed to comprehensively profile all of the significant genomic changes in 20-25 cancers and make the data publicly available. The integrated TCGA network of 17 centers operates as a "pipeline" that includes acquisition of tumor and normal samples, extraction of the DNA and RNA, genome characterization and sequencing and data deposition and analysis. TCGA is a paradigm shifting program that will ultimately benefit all cancers – especially the rare tumors.

For example, TCGA is rapidly characterizing the genomic alterations in rare tumors such as glioblastoma multiforme (most common of the adult brain tumors), ovarian and lung cancer and acute myelogenous leukemia to name a few. The standard of care for a disease such as pancreatic cancer presents a major challenge in terms of acquiring the needed samples, but TCGA is proceeding on two fronts to ensure that the genomics of this lethal tumor are fully characterized. TCGA is collecting samples for evaluation by the U.S. TCGA team – and in parallel is working with members of the International Cancer Genome Consortium to ensure that the ranges of subtypes of this tumor are studied.

Results from TCGA are already allowing scientists to define tumor subtypes – paving the way for significant improvements in therapy. In addition, biomarkers that will evolve from an understanding of the changes in the genomes from specific cancers will drive the

design of new clinical trials for targeted therapies, more specific diagnostics for earlier detection and ultimately usher in a new era of personalized cancer medicine for all cancers.

TCGA is a powerful example of how publically available, multidimensional data from high quality samples can change the future for patients with deadly tumors such as glioblastoma and ovarian cancers. The data are attracting numerous basic and clinical scientists from across all of cancer research to investigate the mechanisms that drive these diseases – and more importantly to use this new knowledge to deliver better interventions to patients. TCGA investigators will be analyzing a number of tumor types in the coming year, including pancreatic cancer. It is anticipated that these data along with those from the international efforts will drive unprecedented insights into the disease and enable the development of more strategic and targeted approaches to diagnosis and treatment.

Beyond the TCGA example, the NCI is also aggressively pursuing a broad research effort for pancreatic and other rare cancers. In 2001, NCI convened the Pancreatic Cancer Progress Review Group (PRG) to identify priority areas for research. Since that time, NCI's support for pancreatic cancer research has grown from $21.8 million in fiscal year (FY) 2001 to $89.6 million in FY 2009. Part of this growth came about through planned actions and funding opportunities specific to pancreatic cancer, and part grew out of an increasingly larger pool of pancreatic cancer researchers successfully competing for general funding opportunities and unsolicited research grants.

Finally, in the past 8 years, the number of investigators funded through the standard principal investigator-funding R01 awards has more than quadrupled, increasing from 34 to 159. The total number of research awards with a pancreatic cancer focus has increased substantially since FY 2000, from 85 projects to 589 projects in FY 2009.

Given the likelihood of shrinking resources, how will you sustain NCI's focus and commitment on basic research?

The NCI spends about half of its total budget on basic research. This type of research contributes to our knowledge of the underlying biology of cancer, and it is essential that we continue our investment in basic research to inform our translational research efforts. In developing its budget, the NCI plans for research that will address critical unanswered questions about many types of cancer. More detailed information about the NCI's research priorities and its requested budget for Fiscal Year 2011 can be found in "The Nation's Investment in Cancer Research: Connecting the Nation's Cancer Community," which is available at http://plan.cancer.gov/ on the internet.

In determining research and funding priorities, we have found that there is no simple correct formula for allocating funds. The NCI carries out a number of priority-setting activities to ensure that they are responsive to new discoveries and opportunities and can make the best use of resources. NCI leaders and staff work closely with researchers and representatives from the scientific, medical, and advocacy communities to identify research opportunities and resource needs – and determine how to best move the science forward. Some specific priority-setting activities include assembling State-of-the-Science Meetings to discuss priorities for clinical trials, as well as frequent calls to the community for suggestions in broad scientific, public health emphasis, or capacity-building areas.

In addition, with the completion of the sequencing of the human genome, it became possible to identify changes in the genomes from cancer patients with the normal sequence. However, to drive a new era of discovery and ensure that we develop an understanding of the molecular basis of every cancer, new innovative programs are required to provide basic scientists with the data they need to determine the mechanisms that drive cancer. Programs such as TCGA are making these data available to all scientists and it is already making a difference in what individual scientists and teams are able to accomplish. The co-existence of basic individual initiated research and large team science programs that provide data and knowledge for all of the communities to employ to generate hypotheses and ask bigger questions about cancer is one of the best ways to sustain momentum in basic research – and ensure its support. Innovation and discovery will always be the foundation of the NCI's research portfolio – and this new era holds unprecedented promise for basic research to flourish in a partnership with team science programs that will finally lead to a fundamental understanding of cancer.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

National Institutes of Health
Bethesda, Maryland 20892

APR 29 2010

The Honorable Mike Rogers
House of Representatives
Washington, D.C. 20515

Dear Mr. Rogers:

Thank you for the opportunity to testify at the March 23, 2010 hearing entitled "NCI Cancer Research: Today's Progress; Tomorrow's Challenges" before the Committee on Energy and Commerce Subcommittee on Health.

I appreciate your interest in the research being conducted at the National Cancer Institute. The enclosed responses to your question for the record provide additional information on our strategies for addressing the many challenges we face in cancer research.

Thank you again for your interest and support of cancer research at the NCI. Please do not hesitate to contact me for additional information.

Sincerely,

Anna D. Barker, Ph.D.
Deputy Director
National Cancer Institute

Enclosure

The Cancer Genome Atlas holds great promise, but it will take time to produce the answers necessary to conquer some of the deadliest cancers. What can NCI do now to address pancreatic and other deadly cancers where there has been little progress in survival rates?

NCI is committed to aggressively pursuing a broad research effort for pancreatic and other rare cancers. In 2001, NCI convened a Pancreatic Cancer Progress Review Group (PRG) to identify priority areas for research. Since that time, NCI's support for pancreatic cancer research has grown significantly. Based on the recommendations in the PRG Report, NCI expanded its portfolio of pancreatic cancer research from $21.8 million in fiscal year (FY) 2001 to $89.6 million in FY 2009. Part of this growth came about through planned actions and funding opportunities specific to pancreatic cancer, and part grew out of an increasingly larger pool of pancreatic cancer researchers successfully competing for general funding opportunities and unsolicited research grants.

In the past 8 years, the number of investigators funded through the standard principal investigator-funding R01 awards has more than quadrupled, increasing from 34 to 159. The total number of research awards with a pancreatic cancer focus has increased substantially since FY 2000, from 85 projects to 589 projects in FY 2009.

Early detection is also a critical challenge for pancreatic cancer, but NCI is working on many fronts to advance early detection. Specifically, early detection is a major focus of the NCI's Nanotechnology Alliance for Cancer. This program leverages the properties of matter at the nano scale to build and multiplex new technologies with unprecedented capacity to detect, treat and prevent cancer. One such example is the work of Dr. Chad Mirkin of Northwestern University, who has developed a gold nanoparticle based biobarcode assay to measure changes in biomarkers in the blood of cancer patients. This assay, already submitted for regulatory approval, has protein detection sensitivity up to six orders of magnitude higher than standard ELISA assays and the potential for broad application in the detection of a number of cancers such as pancreatic cancer.

NCI is also addressing pancreatic cancer along with rare cancers such as other gastrointestinal cancers. Recently, as part of the restructuring of the NCI Clinical Trials Enterprise, NCI formed the Gastrointestinal Intergroup. Pancreatic cancer is one of the gastrointestinal cancers that the group will be looking at as they harmonize an efficient, cost-effective, science-driven, and transparent process that will identify and promote the "Best Science" in gastrointestinal cancer clinical research by addressing the design and prioritization of large phase II studies and phase III trials in these cancers.

The Cancer Genome Atlas (TCGA) can also play a critical role in advancing pancreatic cancer research, and research on other rare cancers. TCGA has already begun to make significant advances on rare cancers. The first three cancer types mapped by TCGA are all considered rare cancers: brain (glioblastoma multiforme), lung (squamous carcinoma) and ovarian (serous cystadenocarcinoma). Pancreatic cancer tissue samples, along with

other types of gastrointestinal cancers, are currently being collected for potential study through TCGA.

After successfully completing the TCGA Pilot Program in 2009, TCGA was expanded to a five-year large scale, high throughput program that is designed to comprehensively profile all of the significant genomic changes in 20-25 cancers and make the data publicly available. The integrated TCGA network of 17 centers operates as a "pipeline" that includes acquisition of tumor and normal samples, extraction of the DNA and RNA, genome characterization and sequencing and data deposition and analysis. TCGA is a paradigm shifting program that will ultimately benefit all cancers – especially the rare tumors.

For example, TCGA is rapidly characterizing the genomic alterations in rare tumors such as glioblastoma multiforme (most common of the adult brain tumors), ovarian and lung cancer and acute myelogenous leukemia to name a few. The standard of care for a disease such as pancreatic cancer presents a major challenge in terms of acquiring the needed samples, but TCGA is proceeding on two fronts to ensure that the genomics of this lethal tumor are fully characterized. TCGA is collecting samples for evaluation by the U.S. TCGA team – and in parallel is working with members of the International Cancer Genome Consortium to ensure that the ranges of subtypes of this tumor are studied.

Results from TCGA are already allowing scientists to define tumor subtypes – paving the way for significant improvements in therapy. TCGA is already making these types of discoveries for glioblastoma, a deadly cancer and the most common malignant brain tumor in adults. TCGA research revealed two new molecular subtypes of glioblastoma and confirmed two previously known subtypes. The findings indicate at least four distinct forms that are recognizable by their genetic signatures, and that the responses to aggressive therapies for glioblastoma vary by subtype. Based on the subtypes, patients can be identified in a logical manner and eventually receive therapies tailored for more individualized care. TCGA's work on glioblastoma is a model for defining the molecular basis of pancreatic and other rare cancers.

In addition, biomarkers that will evolve from the an understanding of the changes in the genomes from specific cancers will drive the design of new clinical trials for targeted therapies, more specific diagnostics for earlier detection and ultimately usher in a new era of personalized cancer medicine for all cancers.

TCGA is a powerful example of how publically available, multidimensional data from high quality samples can change the future for patients with deadly tumors such as such as glioblastoma and ovarian cancers. The data are attracting numerous basic and clinical scientists from across all of cancer research to investigate the mechanisms that drive these diseases – and more importantly to use this new knowledge to deliver better interventions to patients. TCGA investigators will be analyzing a number of tumor types in the coming year, including pancreatic cancer. It is anticipated that these data along with those from the international efforts will drive unprecedented insights into the disease

and enable the development of more strategic and targeted approaches to diagnosis and treatment.

PANCREATIC CANCER ACTION NETWORK
ADVANCE RESEARCH. SUPPORT PATIENTS. CREATE HOPE.

April 28, 2010

The Honorable Anna Eshoo
U.S. House of Representatives
205 Cannon House Office Building
Washington, DC 20515

Dear Congresswoman Eshoo:

Thank you for the opportunity to respond to your question from the Committee on Energy & Commerce's Subcommittee on Health's hearing on March 23, 2010 entitled "NCI Cancer Research: Today's Progress; Tomorrow's Challenges." Your question was:

> *With the support of the Pancreatic Cancer Action Network, last year I reintroduced the Pancreatic Cancer Research & Education Act. Can you explain why pancreatic cancer research is so difficult, compared to other cancers?*

We strongly support your legislation, the Pancreatic Cancer Research & Education Act (HR 745), because we feel that it is essential to finally seeing progress in pancreatic cancer. As you know, only 5 percent of pancreatic cancer patients survive more than five years, making this disease the only major cancer with a five-year survival rate still in the single digits. The survival rates have remained largely unchanged in the last nearly 40 years. Therefore, it is clear that the status quo of the National Cancer Institute's research approach is not working and it is time for Congress to push the NCI to make some necessary changes to finally see progress in this devastating disease.

As grim as the statistics are now, the future looks even bleaker. According to an article in the June 2009 edition of the Journal of Clinical Oncology, cancer incidence is not only projected to dramatically increase in the next 20 years, but "certain cancer sites with particularly high mortality rates, such as... pancreas...will be among those with the greatest relative increase in incidence." In fact, the article projected that pancreatic cancer incidence would increase by 55 percent by 2030.

Pancreatic cancer is a particularly challenging disease to research for a number of reasons:

- Pancreas tissue is very difficult to obtain for research. The pancreas is located deep within the body. Therefore, most tissue samples are obtained only if a patient has surgery to remove the tumor. However, because the majority of pancreatic cancers are caught very late, only 15 percent of all pancreatic cancer patients are eligible for this surgery. Further, even if tissue is obtained at the time of surgery, the tissue sample is usually small, making this resource extremely valuable and scarce.
- Pancreatic tumors are unique in the types of cells that make up the tumor as they are often comprised of a variety of cell types, including dense fibrotic cells that may contribute to the remarkable resistance of the tumor to chemotherapies.

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- Participation in clinical trials is often limited because patients are extremely sick and die quickly of the disease.
- Currently, there are no biomarkers sensitive and specific enough to be useful in the diagnosis of pancreatic cancer.

The fact that pancreatic cancer tissue samples are difficult to obtain means that there are also challenges with getting pancreatic cancer included in The Cancer Genome Atlas (TCGA). Even if these challenges did not exist, the promise of TCGA for most deadly cancers is largely in the distant future. We therefore feel strongly that your legislation is a critical step in ensuring that the NCI take steps now to address the nation's fourth leading cause of cancer-related death, particularly when the significant incidence increase expected in 2030 is taken into account.

I hope that this information addresses the issues you raised in your question. Should you have any further questions or need further information, please let me know. In the meantime, thank you again for on-going leadership on pancreatic cancer and the Pancreatic Cancer Research & Education Act. Our organization remains committed to this legislation. In fact, it will be our top legislative priority at our upcoming Advocacy Day on June 22, 2010, when over 400 pancreatic cancer advocates from across the country will be on the Hill.

Sincerely,

Megan Gordon Don

Megan Gordon Don
Director, Government Affairs

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Office of the Director

April 28, 2010

The Honorable Henry A. Waxman
Chairman, Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington, DC 20515-6115

Dear Chairman Waxman:

I appreciated the privilege to appear before the Subcommittee on Health on March 23, 2010, at the hearing entitled "NCI Cancer Research: Today's Progress; Tomorrow's Challenges." It is also my pleasure to reply to your additional questions as follows:

Question 1: "You described two strategies to promote collaboration within the biomedical research community. Can you elaborate on how the Stand Up To Cancer large grants initiative and NCI-designated Cancer Center model promote collaboration?"

The Stand Up To Cancer (SU2C) and NCI-designated Cancer Center models promote collaboration in several ways. Broadly speaking, the Dream Team concept of SU2C funds teams of investigators working collaboratively to bring new therapies or diagnostics to patients. The National Cancer Institute (NCI) Cancer Center Support Grant funding is determined by the amount of research being accomplished by faculty in defined established research programs, with special emphasis on joint publications and grant awards. Further details for each mechanism are described below.

Stand Up To Cancer (SU2C) Model:

The mission of SU2C is to accelerate research by bringing together multiple experts and encouraging collaboration. One mechanism within SU2C is the creation of "Dream Teams" by awarding grants to researchers from multiple institutions working together to address a significant and tractable hurdle in cancer research and care. These Dream Teams are comprised of talented and promising researchers from multiple institutions representing pivotal areas of expertise required to solve major problems in cancer.

Approximately one year ago, SU2C awarded the first round of three-year grants to five multi-disciplinary, multi-institutional research Dream Teams. The five Dream Teams are comprised of nearly 40 principal researchers from over 20 leading institutions, with more than 300 individuals participating in total.

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On behalf of SU2C, the American Association of Cancer Research (AACR) is responsible for administering the grants, including distributing the funds to the Dream Team leaders' institutions, developing methods of reporting and providing scientific oversight through program management and evaluation of progress during the funding period. AACR and the Scientific Advisory Committee conduct periodic reviews to ensure that milestones and objectives are being achieved. Information is made available to the public at www.su2c.org and www.aacr.org.

Dream Teams span multiple disciplines and institutions, eliminating barriers that often inhibit creativity and collaboration. Dream Team members meet regularly, and now major scientific meetings offer a venue in which all Dream Teams can gather and exchange ideas. In fact, the April 2010 AACR Annual Meeting hosted meetings in which Dream Teams exchanged ideas internally with other Dream Teams, with the SU2C Scientific Advisory Committee, with other cancer research leaders, and with the public. This interaction, along with plans for sophisticated data sharing, fosters collaboration as a fundamental component of each project from the beginning. This unique Dream Team model promises to advance scientific research in the interests of both today's cancer patients and those who may develop cancer in the future.

National Cancer Institute (NCI)-designated Cancer Centers:

Much of the progress made in this country against cancer has been the result of research and cancer care done at NCI-designated Cancer Centers. Currently, there are 65 NCI-designated Cancer Centers in the United States, 40 of which are designated as Comprehensive Cancer Centers. In fact, most major NCI initiatives involve Cancer Centers and their faculty members. NCI-designated Cancer Centers deliver medical advances to patients, educate healthcare professionals and the public, and reach out to underserved populations.

A culture of collaboration is a hallmark of NCI-designated Cancer Centers. Mechanisms for such collaboration within NCI-designated Cancer Centers include Cancer Center research programs, Center shared resources, NCI programs such as the Specialized Programs of Research Excellence (SPORE), multi-investigator grants, and multi-center consortium grants. Programs within NCI-designated Cancer Centers usually include multiple members focused on basic, clinical, translational and/or population research. NCI-designated Cancer Centers add value to these programs by encouraging collaboration of members within each program and inter-programmatic collaboration, resulting in collaborative grant submissions and publications. Intra- and inter-programmatic collaboration between faculty conducting basic and clinical research also fosters translational efforts. Cancer Centers support shared resources of equipment, databases and personnel required by researchers in all programs, which fosters both individual research and encourages collaboration within the Center.

NCI also established SPORE grants that focus on a specific cancer type. SPORE investigators work collaboratively to plan, design and implement research programs that may impact cancer prevention, detection, diagnosis, and treatment. Additionally, SPORE programs have collaborative efforts within the individual multidisciplinary SPORE teams, inter-SPORE collaborations, and collaborations with other NCI/NIH programs, and industry.

Another mechanism that fosters collaboration is the establishment of consortia within an NCI-designated Cancer Center, or between multiple NCI-designated Cancer Centers. For example, as an NCI-designated Comprehensive Cancer Center, The Cancer Institute of New Jersey (CINJ) has fostered a consortium model with researchers at multiple institutions, including UMDNJ, Rutgers University, and Princeton University, to further enhance research efforts. By uniting their expertise in systems biology, genomics, and metabolism with clinical research expertise, these collaborations provide opportunities for interaction that deliver what the NCI has been encouraging, translational research that harnesses basic discoveries for the prevention and treatment of cancer.

Question 2: "How can NCI and its academic partners improve collaboration with industry?"

NCI and its academic partners can improve collaboration with industry in several ways. These include streamlining clinical trials and regulatory processes, improving the process of contract negotiations, and creating precompetitive pools of intellectual property. NCI has developed the Advanced Technology Partnerships Initiative (ATPI), as an effort to improve translation of research discoveries by establishing partnerships with academic research institutions, life sciences companies, and non-profit organizations.

NCI currently has numerous collaborative projects with industry, such as the public-private partnerships organized by the Foundation for the National Institutes of Health (FNIH). Recently, a ground-breaking clinical trial was launched by the FNIH-led Biomarkers Consortium, a unique public-private partnership that includes the NIH, FDA, and major pharmaceutical companies. The I-Spy 2 (Investigation of Serial Studies to predict your Therapeutic Response with Imaging and Molecular Analysis 2) breast cancer clinical trial combines personalized medicine and a novel trial design to evaluate promising new drugs from multiple different companies using molecular cancer biomarkers. Approximately 20 of the Nation's leading Cancer Centers, including NCI-designated Comprehensive Cancer Centers, will recruit and treat patients as part of the trial. This trial effort has also been aided by the involvement of breast cancer advocates.

The Clinical Trials Cooperative Group Program, an NCI-sponsored program designed to promote and support large multi-institutional clinical trials, provides an important venue for collaboration with industry. The Cooperative Groups include researchers, cancer centers, and community physicians throughout the United States, Canada, and Europe. They include more than 3,100 institutions and have more than 25,000 new patients in cancer treatment studies each year (www.cancer.gov). Given the high cost of clinical trials and the current limitations in budget, collaboration with industry is important. In collaboration between industry and an NCI-funded cooperative group, industry often provides the investigational agents and/or funding and the cooperative group provides infrastructure, expertise and centralized public resources. Cooperative groups can also foster collaboration in the development of combination drug studies with products from different companies.

A report by the Institute of Medicine (IOM) was published recently, entitled "A National Cancer Clinical Trials System for the 21st Century: Reinvigorating the NCI Cooperative Group Program" (www.nap.edu/catalog/12879.html). Regarding the potential for combining public and private support, the IOM report recommended facilitation of models in which NCI and industry support various parts of a clinical trial in an appropriate hybrid funding model. The report also identified the importance of streamlining clinical trial and contract processes. Clearly, if clinical trials timelines could be improved, as recommended in the IOM report as well as reports of NCI's Operational Efficiency Working Group (OEWG), industry is more likely to support trials conducted by the Cooperative Groups. The IOM also recommended that NCI "develop standard licensing language and contract templates for material and data transfer and intellectual property ownership in biospecimen-based studies and trials that combine intellectual property from multiple sources." These recommendations would also facilitate industry relationships with other NCI grantees and contract awardees.

Providing the NCI with additional flexibility in forming collaborations with industry, and drawing from the expertise and best practices of decades of drug development and project management in industry, would help accelerate scientific discovery and translation. Currently, a great deal of data that could increase the speed and efficiency of research and development is not shared among academic, government and industrial scientists due to concerns over intellectual property and competitiveness. The establishment of an appropriate precompetitive environment to facilitate sharing of scientific information and research operations would accelerate research.

An important area for such precompetitive collaboration is in the area of biomarker research. As in prior efforts in drug development for cardiovascular disease, biomarkers offer potential for improved drug development in Oncology. Cancer biomarker development and validation is essential to accelerate research to provide patients with personalized treatment to maximize effectiveness while reducing harmful side effects. In this regard, efforts to develop common tools or approaches for research and development are critically important. A precompetitive environment for biomarkers would foster collaboration, instead of competition, in order to expedite research and development. NCI is an obvious candidate to be a precompetitive safe harbor.

I want to thank you again for the opportunity to further discuss these important issues, in an effort to accelerate cancer research with the mission to reduce the burden of cancer on the millions of Americans it impacts.

Sincerely,

Robert S. DiPaola M.D.
Director, The Cancer Institute of New Jersey
Associate Dean for Oncology Programs
Professor of Medicine
UMDNJ-Robert Wood Johnson Medical School

April 28, 2010

The Honorable Henry A. Waxman.
Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington, DC 20515

Dear Chairman Waxman:

Thank you for the questions you submitted as follow up to the March 23, 2010 hearing, "NCI Cancer Research: Today's Progress; Tomorrow's Challenges."

Attached, please find my written responses for the record. If there are any further questions you may have, please do not hesitate to reach out, we would be happy to provide further information or clarification.

We look forward to continuing to work with you and your staff to address these vital issues.

Sincerely,

Jeff Allen, Ph.D.
Executive Director
Friends of Cancer Research

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1. You called for a unified, holistic approach to combating cancer. You also stated cancer research should focus on the classification and study of molecular characteristics of various forms of cancer. And then discoveries from this research would inform the development of targeted treatment. Both you and Dr. Barker mentioned the drug Gleevec as a classic example of a safe and effective treatment that resulted from this approach. I understand part of what made this discovery so groundbreaking is that Gleevec received FDA approval in a record two months.

Can you elaborate on how the research leading to Gleevec embodies the approach you believe cancer research should take?

Historically, many cancers were treated by general chemotherapy which functions by inducing cellular toxicity in attempt to cause highly proliferative cancer cells to die. Because chemotherapy drugs attack healthy cells as well as cancerous cells, side effects are often quite difficult for patients to endure.

Through significant progress made in biomedical research, we now have improved understanding of the characteristics unique to cancerous cells. This information has provided numerous molecular targets that have given us the ability to develop treatments that only the cancerous cells are impacted. For example, two genes that are unrelated in normal cells, were discovered to be mutated and fused together in patients with chronic myelogenous leukemia (CML).[1] The product of this gene fusion, called BCR/Abl, results in CML because cells expressing this mutation grow in an uncontrolled manner.[2] The mutated protein (BCR/Abl) can be a target to distinguish cancerous cells from normal cells, and if the action of the mutant protein can be blocked, then cancerous growth is stopped with relatively few side effects. This is how Gleevec works to impede CML.[3] The results have been astounding and has transformed CML from a disease that had a fatality rate of one hundred percent to a ninety-five percent five year survival rate.[4]

It should be noted that, while Gleevec received FDA approval in 2002 after only 10 weeks of review, it took decades of research and hundreds of millions of dollars, to identify, characterize, and develop a drug toward the BCR/Abl target. Research programs like The Cancer Genome Atlas (TCGA) aim to identify many new potential targets unique to cancer cells. Researchers and patients remain hopeful that the identification of new targets will result in new treatments that will positively impact multiple types of cancer. For instance, while the original approval of Gleevec was for the treatment of CML, it has since been shown to have positive results in the treatment of a rare solid tumor, known as gastrointestinal stromal tumor (GIST).[5] This positive activity occurs because the protein inhibition achieved by the use of Gleevec can occur in other cell types with similar abnormalities. Efficacy in multiple tumor types has been demonstrated with other targeted anti-cancer treatments as well.

This observation of common cellular malfunctions in different cancer types has led researchers to pursue new treatments based on molecular pathways, as opposed to solely examining treatment strategies according to the tumor site. While targeted drugs are generally more efficient, effective, and less toxic, the development and application of such products is not without challenge.

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The use of a targeted treatment may require a diagnostic test to identify the absence or expression of a protein, like BCR/Abl. In many diseases this is becoming increasingly complex. For example, breast cancers can be sub-characterized based on their expression of different protein receptors. Roughly 60% of patients are estrogen receptor positive (ER+), 25% of tumors over express a protein called Her2 (Her2+), and 15% are identified as triple negative breast cancer (ER-, Her2-, and progesterone negative). These three subtypes include tumors that have additional mutations that impact the efficacy of current treatment options.

The use of stratified or "personalized" medicine holds great hope for bettering the lives of patients through by delivering the right treatment, to the right patients, at the right time.

2. You and Dr. DiPaola described the need for improved collaboration to ensure that promising scientific advances made by NCI and others actually translate to safe and effective treatments. I want to ask you about the three types of collaboration you discussed in your testimony: collaboration within the biomedical research community, interagency collaboration, and collaboration with industry partners.

a. I'd like to ask you about collaboration with FDA. What can NCI, and NIH as a whole, do to build upon its relationship with its sister agency?

As the fields of medical product development and regulation become increasingly complex, a stronger, collaborative relationship between the NIH and FDA is vital to continued progress and will benefit the mission of both agencies. While in some areas there are strong working relationship between FDA and specific NIH Institutes and Centers (ICs), the collaboration must be strengthened at multiple levels. A step in the right direction was the February 23, 2010 announcement by Secretary of Health and Human Services Kathleen Sebelius of the formation of a joint FDA-NIH Leadership Council consisting of top officials from both agencies. The Leadership Council has the potential to serve as model for identifying shared scientific priorities and coordination of trans-agency initiatives.

In order to implement the priorities of the Leadership Council, working task forces between specific ICs and FDA divisions must be strengthened. This would allow and encourage utilization of the sister agency as a scientific resource for interaction on specific product applications, clinical trial and protocol design, and jointly developed studies. Additionally, to foster on-going collaboration between the agencies and the development of a well-rounded, expert work force, programs should be established for the joint training and development of FDA and NIH staff. An example of this has been developed through the NCI-FDA Interagency Oncology Taskforce.[6] While this taskforce has successfully developed cross-agency fellowship programs, other activities and potential scientific initiatives have been limited by a lack of resources.

In addition to enhancing the interactions between NIH/NCI and FDA, increased collaboration across all federal health related agencies is vital to realize the full potential of cancer research. Through collaboration we can streamline cancer research, detection, treatment, prevention, surveillance, product regulation, care delivery, reimbursement of services, and learn from all of these cancer-related functions as a routine by-product of care. This will ultimately lead to increased survivorship, reduction of cancer incidence and mortality, and improvement of the lives of all who may face this disease.

The challenges of establishing a collaborative, enduring relationship between federal health agencies and NIH/NCI are not insignificant. The core mandate of each agency is rightfully quite different, the organizational structures are not common, and there is, at times, resistance to modifications to current practices displayed by each based on professional experience and long standing cultural differences.

[6] NCI-FDA Interagency Oncology Taskforce: http://otir.cancer.gov/programs/partnerships_iotf.asp Accessed 4/27/10

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However, the common goal of improving public health must trump these barriers and should be embraced and promoted through scientific collaboration.

The NCI drives the advancement of cancer research, but in order to truly impact this disease a comprehensive approach is needed. In 1971, the National Cancer Act was passed and provided the NCI Director, with the advice of the National Cancer advisory Board, the authority to "plan and develop an expanded, intensified, and coordinated cancer research program encompassing the programs of the National Cancer Institute, related programs of the other research institutes, and other Federal and non-Federal programs."[7] As a part of this authority, the NCI regularly outlines their research portfolio and the broad plans for the National Cancer Program as a part of their annual report and budget estimate. However, many of the oncology activities that occur as routine functions of other health related federal agencies are not done in direct collaboration with the NCI. This is not to imply that all cancer-related activities of the federal government should occur at the NCI, but rather that the scientific data and expertise housed at multiple agencies should be available and capitalized on by sister agencies. Each agency needs to ultimately retain their independence and autonomy, but improved coordination at all levels of cancer discovery, product regulation, delivery of services and surveillance will synergistically advance the field of oncology. Multi-agency collaboration for cancer research should not be delayed. We must tear down the silos that exist between all government agencies that aim to conquer cancer.

b. How can NCI and its academic partners improve collaboration with industry?

Partnerships with organizations outside of the federal government have an important role in providing access to technologies, resources, and data that may not be possible for duplication within the government and offer valuable additional perspectives to many scientific discussions. Therefore, it is important that external partnerships and collaborations with academic centers, industry, patient and advocacy groups continue to be fostered. Engaging external stakeholders and improving transparency will help provide public confidence in the decisions that are ultimately made. Effective partnerships have been developed between federal agencies and non-government entities, often via public-private partnerships like those at the Foundation for the NIH (FNIH) and potentially through the Reagan-Udall Foundation for the FDA.
As I mentioned in my testimony, just last month, the Biomarker Consortium, a public-private partnership through the Foundation for the NIH, announced the opening of the I-SPY2 TRIAL. This clinical trial will utilize an innovative new model that use biomarkers from individual patients' tumors to screen promising new treatments for breast cancer and identify which treatments are most effective in specific types of patients.[8]

This type of coordination will require a significant commitment from the leadership of multiple agencies and organizations to coordinate on-going activities, and demonstrate the importance of collaboration at various levels. Additionally, considerable resources will be needed to support meaningful projects designed to advance the common goal of improving the health of the American people.

[7] National Cancer Act of 1971. PL 92-218
[8] I SPY 2 TRIAL (Investigation of Serial **S**tudies to **P**redict **Y**our **T**herapeutic **R**esponse with Imaging **A**nd mo**L**ecular Analysis 2): http://ispy2.org/ Accessed 4/27/10

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